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# Engaging Secondary Math Teachers in Breaking Down Barriers for English Learners

Julie M. Kane
*Loyola Marymount University*, juliekane2@me.com

LOYOLA MARYMOUNT UNIVERSITY

Engaging Secondary Math Teachers in Breaking Down Barriers for English Learners

By

Julie M. Kane

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Doctor of Education

Engaging Secondary Math Teachers in Breaking Down Barriers for English Learners

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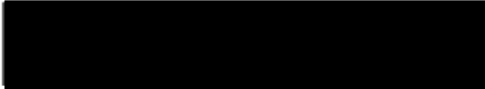
Julie M. Kane

**Loyola Marymount University**
**School of Education**
**Los Angeles, CA  90045**

This dissertation written by Julie M. Kane, under the direction of the Dissertation Committee, is approved and accepted by all committee members, in partial fulfillment of requirements for the degree of Doctor of Education.

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Dissertation Committee

Rebecca Herr Stephenson, Ph.D., Dissertation Chair

Karen Huchting, Ph.D., Committee Member

Francisco Ramos, Ph.D., Committee Member

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**DEDICATION**

This dissertation is dedicated to all students who are newcomers, who don't fit in, who don't speak the language, who learn differently, and due to lack of educational opportunities afforded, have fallen behind, particularly in math.

It is also dedicated to the teachers charged with ensuring the success of these students every day, in the hope that we might collaboratively develop professional learning systems *with and for* teachers who are actively shaping and improving their instruction based on student needs, self-reflection, and practice with research-based strategies.

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# ABSTRACT

Engaging Secondary Math Teachers in Breaking Down Barriers for English Learners

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This study used mixed methods to examine middle school mathematics teachers' beliefs about English Learners' ability to participate in rigorous, grade-level math instruction as well as beliefs about their own capacity for teaching English Learners. Additionally, the study investigated the influence of teachers' beliefs on their instructional practices and identified the types of support teachers need to develop as culturally and linguistically responsive educators. Findings revealed some dissonance between teachers' explicit beliefs about teaching English Learners and their implicit beliefs illustrated through instructional decisions made, as well as previously unrecognized gaps in teachers' ability to identify and differentiate the needs of different types of English learners. Finally, the study identified teachers' pressing needs for additional support at the school and district levels to continue to develop skills and knowledge to improve their teaching for English learners. The study concluded with an action plan for developing a robust professional learning system to develop teachers' self-efficacy as culturally and linguistically responsive educators while also addressing implicit bias through reflection.

# CHAPTER 1

# INTRODUCTION

Language exerts incredible power. It can be a barrier or a bridge to incredible possibilities.
—Vision of the California Language and Literacy Innovation Collaborative, Secondary
Academic Language Team (California Education Partners, 2019)

English learners constitute a large and rapidly growing segment of the United States'

student population, totaling 4.6 million students, with 18 states having between 6% and 10% of

their population classified as English learners (National Academies of Sciences, Engineering,

and Medicine, 2017). California has the largest concentration of English learners in the US. The

California Language Census (California Department of Education, 2019) in fall 2017

demonstrated that the state's 1,271,150 English learners constituted 20.4% of the total

enrollment in California public schools. Combining English learners and fluent English

proficient students, a total of 2,637,412 students in California spoke a language other than

English in their homes, representing about 42.3% of the state's public school enrollment. Though

English Learners attend schools in districts throughout the state, they are concentrated in larger

districts. For example, 17% of California's English learner population is enrolled in the San

Diego Unified and Los Angeles Unified School Districts alone (Hill, 2012).

Alongside the explosive growth of this population, English Learners are also increasingly

diverse. California collected English learner data for 65 language groups, and 94% speak one of

the top 10 languages in the state: Spanish (82.2%), Vietnamese (2.2%), Mandarin (1.8%), Arabic

(1.5%), Filipino or Tagalog (1.3%), Cantonese (1.2%), Korean (0.8%), Hmong (0.7%), Punjabi

(0.7%), and Russian (0.7%) (California Department of Education, 2019).

English Learners also have a wide variety of language and academic backgrounds as well as immigration experiences that impact the design of effective instruction for them. Researchers have developed categories of English Learners based on their language, academic, and psychosocial needs (Dolson & Burnam-Massey, 2011), and those of secondary students (grades 6 through 12) are summarized here:

- *Well educated newcomer:* a foreign-born student often from middle or upper socioeconomic groups with high level of schooling and academic success in home language, often with some previous English instruction, and an ability to participate in sheltered English instruction and an accelerated ELD sequence.

- *Grade level newcomer:* a foreign-born student who may have challenges of poverty, immigration, and discrimination, with average achievement in school in home country and likely no exposure to English, and a need for regular ELD sequence, literacy development, and sheltered content instruction. Benefits significantly from counseling for self-esteem, guidance, motivation, and positive cross-cultural adjustment.

- *Under schooled newcomer:* a foreign-born student who may not have attended school or has interrupted schooling due to political violence, social unrest, natural disasters, crime, or poverty; has low levels of literacy in home language and little to no exposure to English; generally suffers from low self-esteem and the effects of trauma, discrimination, poverty, and immigration; and has a critical need for extended ELD, literacy development, supplementary content instruction to fill gaps, and counseling to address past negative experiences

- *Normally progressing English Learner:* May be U.S. or foreign born, but has usually been in the country for at least three years; making steady progress in English and benefits from the regular ELD sequence and a combination of sheltered and mainstream classes.

- *Long-Term English Learner:* Often U.S. born or has been in the country for at least six years with instruction in English; has fluent listening and speaking skills in English but struggles with the academic English of reading and writing; and needs intensive ELD and academic English supports as well as personalized counseling. (Dolson & Burnam-Massey, 2011)

This diversity of home languages, levels of English proficiency, and prior educational and life experiences of English Learners presents numerous challenges for academic learning and performance in schools where English is the primary language of instruction and assessment (Dolson & Burnham-Massey, 2011). The unfortunate outcome for English Learners is a large gap in achievement with their English-monolingual peers. This gap was particularly noticeable in math, where 12% of English Learners met or exceeded grade level standards on the California Assessment of Student Performance and Progress (CAASPP) in 2017, compared with 41% of Reclassified Fluent English Proficient (RFEP) students, 42% of English only students, and 61% of Initially Fluent English Proficient (IFEP) students. On the 2015 National Assessment of Educational Progress (NAEP), only 2% of California eighth-grade English Learners scored proficient or better compared to 31% of non-ELs (Ruffalo, 2018). And in the school district of this study, a parallel gap in achievement exists, with 4% of English Learners scoring proficient, compared to 26% of students overall in 2017-18.

This gap in math achievement is particularly damaging, as math is a key gatekeeper to social mobility for the general student population, and access to appropriately sequenced math courses at the secondary level is essential to students' success in and beyond high school (Martin, Gholson, & Leonard, 2010; National Council of Supervisors of Mathematics & TODOS: Mathematics for ALL, 2016).  As a group, students of color remain largely underrepresented in the Science, Math, Engineering, and Technology (STEM) fields although the demand for workers and professionals is outpacing all other fields and remains unmet (National Academies of Sciences, Engineering, and Medicine, 2018). This lack of access to a large and growing landscape of employment opportunities begins with access to math instruction and has large scale implications for students' earning potential throughout their lifetimes. Access to emerging job markets is particularly important for breaking the cycle of poverty for English learners, whose poverty rates range from 74% to 85%, much higher than the 21% overall poverty rate for California school-aged children (Hill, 2012), making the acquisition of math skills one of the greatest civil rights issues of our time for students of color (Moses & Cobb, 2002).

## Barriers to Educating English Learners in California

The challenges of low English language proficiency, lack of prior schooling in the home language, and trauma can be remediated for English Learners when they are taught by teachers who possess an understanding of their instructional and social-emotional needs as well as deep knowledge of pedagogy and an extensive repertoire of strategies with which to respond (Dolson & Burnham-Massey, 2011). Upon arrival in U.S. classrooms, however, many English Learners unfortunately encounter several barriers to academic success, which include a teacher-student diversity gap and negative social and political attitudes towards English Learners. In the area of

math, particularly at the secondary level, English Learners face yet another barrier, and this is the fact that their teachers are still grappling with adapting their instruction to the pedagogical shifts and increased language demands of the Common Core State Standards for all students, including English Learners, with limited professional development, resources, and time to plan. In the next sections, I will examine each of these barriers in turn.

**Barrier Number One: Teacher-Student Diversity Gap**

California has attempted to meet the challenge of educating the growing English Learner population by requiring all pre-service teachers to be certified to teach English Learners in order to receive their preliminary teaching credential (California Commission on Teacher Credentialing, 2020). My experience as a district leader, however, mirrors Daniel's (2015), in that many of these teachers do not encounter models of this expected pedagogy in either their pre-service practicums or their first assignments as teachers, and thus the core learnings quickly fade. This underscores the importance of understanding and mediating teachers' beliefs about students' learning needs and their instructional practices, as the gap between teachers and their students in the United States in terms of race, language proficiency, and socioeconomic status continues to grow. Currently, 51.5% of students in the US are students of color (McFarland et al., 2017), and that percentage is increasing, while the racial composition of teachers remains stagnant. The United States Department of Education projected that by 2024 students of color will comprise over 56% of students in the US, while 82% of elementary and secondary teachers and 80% of school leaders identify as White (U.S. Department of Education, 2016). This gap is problematic due to the fact that cultural insensitivity and a lack of teacher cultural awareness have been found to be contributors to student failure, and that "it is children of color who bear

the brunt of negative and inappropriate responses to who they are" (Goodwin, 1997, p. 133, as quoted in Flores & Smith, 2009, p. 329). Both pre-service and in-service White teachers have demonstrated a lack of understanding of the sociopolitical context of teaching English as a Second Language and issues of access and equity, as well as unconscious racism and stereotypes, deficit thinking, false empathy, and ignorance of their privilege as White Americans (Ajayi, 2011; Marx & Pray, 2011). This gap between teachers and their students also impacts teachers' ability to develop positive relationships with students, which contributes to their feelings of personal responsibility for student outcomes (Lauermann, 2014). Teachers who differ in culture, language, and/or socioeconomic status from their students often struggle with developing such positive relationships due to discomfort or an inability to relate to students whose experiences are different from their own (Kumar & Hamer, 2013). Further, teachers who view rapid assimilation as the most effective way to normalize members of the out-group will be unlikely to engage in culturally relevant practices (Kumar, Karabenick, & Burgoon, 2015).

These challenges have come to the forefront in the current political context in the United States. Studies published prior to the 2016 presidential election indicated that despite contemporary social norms that disavowed outright prejudice and discrimination, teachers might still demonstrate unconscious bias in their behavior and instructional choices (Baumeister & Bargh, 2014; Flores & Smith, 2009; Van den Bergh, Denessen, Hornstra, Voeten, & Holland, 2010). The 2016 U.S. presidential election, however, turned those social norms upside down, making preferences for white, protestant, English-only culture socially acceptable to proclaim out loud in some segments of society, and as such, discrimination and hate crimes against non-white, non-English speaking, and non-Christian groups have risen (Costello, 2016; Pollock,

2017; Rogers et al., 2017). As the United States approaches the 2020 presidential election, relations have deteriorated even further, as demonstrated by the outrage expressed through ongoing national Black Lives Matter protests in response to the death of George Floyd at the hands of Minneapolis police officers (Hill et al., 2020).  As a result of this political activism across the country, anti-racist education for police, state and local government agencies, and schools is being demanded (Gewertz, 2020). Now more than ever the importance of eradicating both explicit and implicit bias in all elements of society is evident, and teachers play a critical role in this process.

**Barrier Number Two: History and Politics**

The swing to open opposition towards immigrants and English Learners is part of a historical pattern of the ever-changing political climate in the United States, which has a long history of conflict around how to (or whether or not to) accommodate the needs of English Learners in its schools. U.S. education policy has swung back and forth between two opposing views: assimilationist, which values one national language as a necessary tool to bind U.S. citizens together, and pluralistic, which values linguistic and cultural diversity as a national strength (Baker, 2011; Crawford, 2007; Cummins, 2007; de Jong, 2013; Scanlan & Lopez, 2012; Wiese & Garcia, 1998; Wiley, 2007). These two opposing views do not exist in a vacuum, however, and Baker (2011) summed up the many-layered context surrounding such opposing views by stating that

> Bilingualism and bilingual education, whatever form they take, cannot be properly
> understood unless connected to ideologies and politics in society. The activity of a
> bilingual classroom, and decisions about how to teach language minority children, are not

based purely on educational preferences. Rather, calls for and against bilingual education

are surrounded and underpinned by basic beliefs about minority languages and cultures,

linguistic and cultural diversity, immigration and immigrants, equality of opportunity and

equality of outcomes, empowerment, affirmative action, the rights of individuals and the

rights of language minority groups, assimilation and integration, desegregation and

discrimination, pluralism and multiculturalism, diversity and discord, equality of

recognition for minority groups, social division, and social cohesion. (p. 374)

This ever-swinging pendulum has caused schools and school districts to exist in reactive mode

for decades, adjusting to, adding, eliminating, and then returning to teaching pedagogies

matching the ideological view in power, some of which were decided in Supreme Court

decisions (e.g., *Lau v. Nichols* (1974), *Castañeda v. Pickard* (1981)), and in California, by voter

initiatives (e.g., *Proposition 227* (1998), *Proposition 58* (2016)). The debate surrounding *Lau v.*

*Nichols* (1974)*,* the landmark decision that cracked open rights for language minority students, is

particularly illustrative of the assimilationist view that was prevalent in California at the time.

The lawsuit was brought against the San Francisco School District (SFUSD) on behalf of

Chinese students in 1970 who argued that SFUSD's failure to provide bilingual education

violated the equal protection clause of the 14th Amendment, Title VI of the *Civil Rights Act*

(1964), and the *Bilingual Education Act* (1993). This case was accepted by the Supreme Court in

1974 after being rejected by the federal district court and a court of appeals. The lawsuit's

rejection was not out of alignment with the political context of California at the time, which had

a history of discrimination on the basis of race, particularly against Asians. This was exemplified

by anti-Chinese groups lobbying the U.S. government to pass the *Chinese Exclusion Act* (1882),

and a provision in the California Constitution that "affirmed legal segregation of school children of Indian, Chinese, Japanese, or 'Mongolian' parentage" (Wiley, 2007, p. 98) until it was overturned in 1947. The dominant attitudes regarding language were evident in the Ninth Circuit Court of Appeals ruling which stated:

> The discrimination suffered by these children is not the result of laws passed by the state of California, presently or historically, but is the result of deficiencies created by the children themselves in failing to know and learn the English language. (Wiley, 2007, p. 99)

This ruling was consistent with attitudes expressed 66 years earlier in the *San Francisco Chronicle* in support of segregation:

> There is also objection to taking the time of teachers to teach the English language to pupils, old or young, who do not understand it. It is a reasonable requirement that all pupils entering the schools shall be familiar with the language in which instruction is conducted. We deny either the legal or moral obligation to teach any foreigner to read or speak the English language. And if we choose to do that for one nationality, that is our privilege. (Wiley, 2007, p. 99)

The *Lau* (1974) remedies, as outlined in the opinion of the Supreme Court, effectively negated those arguments, stating that "before a child can effectively participate in the educational program, he must already have acquired those basic skills is to make a mockery of public education" (Wiley, 2007, p. 100). Though requiring that language minority students be taught English, *Lau* did not mandate bilingual education, nor did it identify specific remedies. Determining whether school districts had complied with *Lau v. Nichols* (1974) was not clearly

articulated until *Castañeda v. Pickard* (1981), which established the three-pronged test for whether or not schools were providing appropriate services for English Learners. This three-pronged test mandated that programs for language minority students be (a) based on a sound educational theory, (b) implemented effectively with sufficient resources and personnel, and (c) evaluated to determine whether they are effective in helping students overcome language barriers.

Following this pendulum shift, California later passed the *Chacon-Moscone Bilingual Bicultural Education Act* of 1976 (AB1329), which mandated the establishment of English as a Second Language and bilingual education programs (California Department of Education, 2010). This act was a response to the growing population of English Learners in California and provided funding and training for bilingual teachers to increase English fluency for these students. It was also designed to promote cross-cultural understanding, to provide equal opportunity for academic achievement, and to provide positive reinforcement of English Learners' self-image. AB1329 was replaced by the *Bilingual-Bicultural Education Reform Act* of 1980 (AB507), and despite the fact that it sunset in 1987, bilingual education continued to be the norm in California until the pendulum swung again with the passage of *Proposition 227* (1998), the "English Language in Public Schools" initiative statute.

*Proposition 227* (1998) passed by a margin of 61% to 39%, and dismantled California's public school bilingual education programs, which provided native language instruction to limited English proficient students. This was based on the rhetoric that

> the public schools of California currently do a poor job of educating immigrant children,
>
> wasting financial resources on costly experimental language programs whose failure over

the past two decades is demonstrated by the current high drop-out rates and low English

literacy levels of many immigrant children; and . . . young immigrant children can easily

acquire full fluency in a new language, such as English, if they are heavily exposed to

that language in the classroom at an early age (Justia US Law, 2020).

With the passage of *Proposition 227* (1998), the bilingual programs were replaced with a system

of "structured English immersion," in which instruction was provided "overwhelmingly" or

"nearly all" in English. These terms made teachers nervous, particularly since Section 320

afforded parents a right to sue if their child or children were not provided English-only

instruction. Teachers therefore challenged Proposition 227, arguing in *California Teachers*

*Association v. State Board of Education (*2001) that the proposition was unconstitutionally vague

by failing to define clearly when teachers were required to speak in English and how much non-

English would subject them to personal liability (Justia US Law, 2020).

Soon after Proposition 227 (1998) replaced bilingual education with Structured English

Immersion, studies began to report negative results for English Learners, such as after five years

of Structured English Immersion, just 30% of the Limited English Proficient (LEP) students had

conversational English and only 7% were able to follow academic instruction from school

textbooks at grade level (Crawford, 2007). This lack of progress created a new category of

English Learner, the "Long-Term English Learner" (LTEL), whose profile includes struggling in

secondary school, lack of access to higher level courses, and higher dropout rates in high school

(Olsen, 2010). In contrast, Collier and Thomas (2004) found that dual language immersion

programs closed the academic achievement gap for all categories of students including English

Learners, students with special needs, and English proficient students. Further, they found that

students who participated in dual immersion programs through the eighth grade showed overall achievement higher than that of all other student groups. Thus, dual language immersion programs increased substantially across the United States (Howard, Sugarman, Christian, Lindholm-Leary & Rogers, 2007), and the pendulum shifted again in California with the adoption of English Language Development standards and the English Language Arts/English Language Development Framework for California Public Schools in 2014. California also changed how it funded its schools to be more equitable for English Learners with the introduction of the Local Control Funding Formula (LCFF) in 2015, and finally reversed the English-only educational mandate of Proposition 227 with the passage of Proposition 58, the California Multilingual Education Act of 2016. This was followed in quick succession by the adoption of the California English Learner Roadmap (California Department of Education, 2018a) and the Global California 2030 initiative (California Department of Education, 2018b) released in 2018 by the California State Superintendent of Instruction, which calls for at least 50% of California students to be enrolled in dual language programs by 2030.

Teachers across the US, and particularly in California, have been caught between these two polemic ideologies of multilingualism and assimilation, with limited support and resources to respond to shifting priorities. Teachers find themselves constantly reacting to changing laws, policies, and curricula without adequate supports or meaningful participation in the decision-making process (Hinnant-Crawford, 2016; Karabenick & Noda, 2004; Ruffalo, 2018).

**Barrier Number Three: Math as Gatekeeper**

The teacher-student diversity gap and pendulum swings between attitudes towards English Learners are compounded in the area of math by the shifts in teaching pedagogy

demanded by the adoption of the Common Core State Standards. In their 2018 study, Cobb, Jackson, Henrick, Smith, and the MIST Team found that "mathematical learning goals for students reflect a set of values regarding what is worth knowing and doing mathematically" (p. 44). These values took a serious turn when the Common Core State Standards (CCSS) for English Language Arts and Mathematics were adopted in California in 2010 and modified in 2013. The CCSS were developed through a voluntary, state-led effort coordinated by the Council of Chief State School Officers (CCSSO) and the National Governors Association (NGA) Center for Best Practices to prepare students for success in career and college. The CCSS have had a particularly challenging impact on teachers' math instruction, forcing a move away from the traditional role of teachers leading students through formulaic problems and students listening carefully and following directions, to an emphasis on mathematical practices such as developing arguments, dissecting the arguments of others, and mathematical discourse (California Department of Education, 2013; Louie, 2017; Munter, Stein, & Smith, 2015; Ruffalo, 2018). See Appendix C for the Standards for Mathematical Practice from the Common Core State Standards.

The shift also forced the profession to reexamine traditional beliefs about mathematics ability, which Louie (2017) termed as math's historical "culture of exclusion," which narrowly limited opportunities for many students to develop identities as "mathematically capable learners and thinkers" (p. 489). The expectation with the Common Core standards is that they be accessible to all learners, and teachers are expected to ensure that students such as English Learners have equitable access to rigorous learning opportunities in math (Ruffalo, 2018). Thus math teachers are now required to also be language teachers, a shift for which most are seriously

underprepared due to a lack of appropriate instructional materials, teacher training in language acquisition theory and pedagogy, and time and support for teachers to learn how to integrate English Language Development into mathematics instruction (Martin & Strom, 2016; Ruffalo, 2018). Teaching language is challenging for teachers at all levels, but perhaps even more so for secondary teachers, who hold a subject-specific credential versus elementary teachers, who are trained to teach all subjects, including language arts, in a single classroom.

## Developing Effective Teachers for English Learners

In order to effectively teach English learners, teachers need content knowledge as well as the pedagogical knowledge of how to teach that content; a vision of high-quality instruction that focuses on continuous improvement; a belief that their students are capable, which drives teaching practices that engage all students in rigorous activities; and a school and district environment that work together to support their efforts (Cobb, Jackson, Henrick, Smith, & the MIST Team, 2018; The New Teacher Project [TNTP], 2018). Knowledge includes knowing who their English learners are (a newcomer to the country versus long-term English learner, one with significant vs. interrupted schooling in the home language, social emotional needs, etc.); the language demands of the content they teach; how to encourage and support students in bringing their experiences, culture, heritage, and language into the classroom; and how to bridge any skill gaps the students might have. Beliefs include high expectations, especially an expectation that English Learners are capable of engaging in rigorous work. And finally, the environment includes professional learning, resources, and administrative support so that they feel empowered to alter and shape curriculum to target the needs of their students (Olsen, 2010). This combination of beliefs and dispositions are the elements of what the literature identifies as

culturally and linguistically responsive teaching (Gay, 2000; Hollie, 2018; Ladson-Billings, 1995; Villegas & Lucas, 2011; Paris & Alim, 2014). A full discussion of the evolution of the definitions of these terms will be explored in Chapter 2, but for ease of understanding here, a brief definition of both are articulated:

- *Culturally Responsive Teaching:* This paradigm values the culture, knowledge, prior experiences, and language that students bring from home, and uses this cultural knowledge to guide curriculum development, classroom climate, instructional strategies, and relationships with students. Culturally responsive teachers also plan for student success, recognizing that their responses to their students' struggles are important for ensuring that they will persevere toward high levels of academic success (Cobb et al., 2018; Gay, 2018; Hollie, 2018).

- *Linguistically Responsive Teaching*:  Linguistically responsive teachers have (a) an understanding of the importance of learning about students' backgrounds and strategies for how to do so; (b) a deep understanding of how students learn a second language and how to apply that knowledge to instruction; (c) the ability to identify the linguistic features and demands of academic tasks, including key vocabulary and the linguistic expectations for successful completion of tasks; and (d) a repertoire of strategies to scaffold instruction to make it accessible and comprehensible (Lucas & Villegas, 2013).

How do schools and districts develop teachers with the appropriate mindsets and skill sets to teach English Learners effectively, particularly in math? Martin and Strom (2016) identified three strategies for increasing the number of linguistically responsive teachers: (a)

increasing teacher knowledge of the specific pedagogical shifts that are needed to bridge the gaps for English Learners; (b) diversifying the workforce to include more teachers of color who can relate to the experiences of English Learners; and (c) incorporating reflective practices into teacher professional development to help them gain a better understanding of their own cultural identities as well as those of their students.

Increasing teacher knowledge of the specific pedagogical shifts that are needed to bridge the gaps for English Learners is essential, and despite the rapidly growing English learner population in U.S. schools, most pre-service and in-service teachers have had limited professional development for teaching English Learners, few have taken courses on issues related to English learners, and few have had the experience of learning a second language (Bunch, 2013; Daniel, 2015; Jimenez & Rose, 2010; Lucas & Villegas, 2013; Lucas, Villegas, & Freedson-Gonzalez, 2008; Martin & Strom, 2016; Olsen, 2010). This lack of teacher preparation for teaching English Learners is associated with poorer educational outcomes for these students. Even for those teachers who have received adequate professional development, teachers will not implement strategies learned unless they believe their students are capable of rigorous work (Cobb et al., 2018; Olsen, 2010; TNTP, 2018).

Martin and Strom's (2016) second strategy, diversifying the teacher population to include more teachers of color, is important but cannot be a strategy in isolation, as it is a slow moving, long-term goal and will not do much to change outcomes for the students currently sitting in U.S. classrooms. The United States Department of Education estimates that by 2024 over 56% of students in the U.S. will be students of color, while 82% of elementary and secondary teachers and 80% of school leaders will identify as White (U.S. Department of Education, 2016). Though

the number of minority teachers in the nation doubled from about 325,000 in the late 1980s to 660,000 in 2012, "closing the diversity gap would require about a million White teachers to exit the profession, to be replaced by about 300,000 black teachers and over 600,000 Hispanic teachers" (Putman, Hansen, Walsh, & Quintero, 2016, p. 4). This challenge is further exacerbated by the high turnover rates for minority teachers in general (Villegas & Irvine, 2010) and by the current political context where teachers of English Learners who are essential to ensuring cultural and linguistic diversity include approximately 20,000 teachers with DACA protections who are under threat of deportation (Shapiro & Partelow, 2018).

This teacher diversity gap, which is "measured by subtracting the percentage of teachers of a certain race or ethnicity from the percentage of students of that same race or ethnicity" (Shapiro & Partelow, 2018, p. 1) warrants attention, as not just minority students, but all students benefit from minority teachers or exposure to a teaching population that matches the racial/ethnic composition of the student body (Cherng & Halpin, 2016; Putman et al., 2016; Sawchuck, 2012; Shapiro & Partelow, 2018; Villegas & Irvine, 2010). Villegas and Irvine (2010) further explained that it is not just the match in racial/ethnic composition, but rather what highly effective minority teachers do to achieve these positive results. These practices include:

(a) having high expectations of students; (b) using culturally relevant teaching; (c) developing caring and trusting relationships with students; (d) confronting issues of racism through teaching; and (e) serving as advocates and cultural brokers. (p. 180)

Cherng and Halpin (2016) added that minority teachers have experience navigating the world as non-majority participants, and thus see strengths in students that are not always valued in mainstream schooling.

Sharing the same ethnicity as their students is not necessarily a panacea for changing student outcomes, however. Flores and Smith (2009) found that the beliefs of minority teachers about how to succeed in U.S. society strongly influenced their interactions with students, and that "all teachers, of any ethnic background, must engage in critical reflective practices that challenge their preconceived notions about minority children" (p. 327).

Martin and Strom's (2016) third strategy, building the reflective practices of the teachers we have, is the lever that has not received enough research, support, and fortification. Diversifying the workforce does not guarantee a supply of culturally and linguistically responsive teachers, and a focus on pedagogy, though also critical, can have only a minimal impact on student outcomes without changing the belief systems of teachers.

It is particularly important to build reflective practices in the teachers already employed, as despite California's mandate that all pre-service teachers be certified to teach English Learners, my experience mirrors Daniel's (2015) in that many teachers do not encounter models of this expected pedagogy in either their pre-service practicums or their first assignments as teachers, and thus the core learnings, if experienced at all, quickly fade. Much of the literature in fact focuses on building empathy and understanding of the needs of English Learners in teacher pre-service coursework (Daniel, 2015; Jimenez & Rose, 2010; Marx & Pray, 2011), but little seems to engage with changing the perceptions of teachers already employed. In my experience, this is the key challenge in building effective programs for English learners.

## Statement of the Problem

Secondary math teachers exist in a stressful world of demands to shift how they teach mathematics for all students with the advent of the Common Core State Standards and their

emphasis on using language to explain one's thinking, defend an argument, and evaluate the arguments of others (California Department of Education, 2013). This stress, coupled with the increased challenges of making this content accessible to a growing population of English Learners, the majority of whom are Long-Term English Learners (LTELs), can pose a challenge for math teachers, who are trained deeply in their specific content areas and have little if any experience or education in how to accommodate students' needs for language development (National Academies of Sciences, Engineering, and Medicine, 2018; Ruffalo, 2018). Further, research has shown that many secondary teachers have the misconception that students must be proficient in English before being able to participate successfully in content-area classes, and therefore do not hold high expectations for English learners or make efforts to ensure access to course content in subjects such as science and mathematics (National Academies of Sciences, Engineering, and Medicine, 2018; Ruffalo, 2018). This de facto exclusion from math is particularly pronounced, as mathematics frequently is framed as a fixed body of knowledge to be received, with students who do not easily grasp concepts positioned as deficient and excluded from many rich learning opportunities (Louie, 2017).

The problem this study addressed was how to build the capacity of secondary mathematics teachers in removing barriers for English Learners. The study examined efforts to create professional development to increase knowledge of quality educational services for English Learners and positively impact teachers' attitudes, beliefs, and behaviors towards this student population such that they are included and effectively supported in high-quality, rigorous mathematics instruction.

## Purpose of the Study

The purpose of this study was to gain an understanding of how middle school math teachers perceive English Learners' abilities to participate in rigorous, grade-level math instruction in the age of Common Core Mathematics, and how they perceive their capacity as teachers to provide such instruction. Further, it explored what teachers feel they need at the school and district level in order to support their successful implementation of the Common Core Mathematics Standards as culturally and linguistically responsive teachers. Surveys were used to get a broad understanding from all middle school math teachers in the district, and then semi-structured interviews with selected teachers were utilized to delve deeper into the issues raised and patterns discovered in the survey data.

## Research Questions

To better understand how to support teachers in developing the necessary beliefs and skills for working effectively with English Learners, this study focused on these three research questions:

- What are middle school math teachers' beliefs about English Learners' abilities to participate in rigorous, grade-level math instruction aligned with Common Core Mathematics and their own capacity to provide such instruction?

- How do these beliefs about students' and their own capacities impact the instructional decisions they make?

- What school and district level supports do middle school math teachers identify as necessary for supporting their development as culturally and linguistically responsive

teachers who successfully implement rigorous, grade-level math instruction aligned

with the Common Core Mathematics Standards?

## Conceptual Framework

The aim of this study was to understand and influence teacher behavior to provide

ambitious and equitable instruction for English Learners in middle school math classes, and thus

drew upon the rich history of the study of human cognition, motivation, and behavior in

psychology. Just as the field of education has repeatedly reacted to the pendulum swings

between multiculturalism and assimilation for immigrants to the US, it has also been influenced

by the different movements in psychology, which have swung back and forth between an

emphasis on internal processes by psychologists such as Williams James, Charles Horton

Cooley, Sigmund Freud, Lev Vygotsky, Abraham Maslow, Carl Rogers, Arthur Combs, and

Donald Snygg, and a focus on a person's tangible, observable, and measurable behavior, as

advocated by Pavlov, Thorndike, John Watson, and B. F. Skinner (Schunk & Pajares, 2002).

Finding neither of these extreme positions complete in and of themselves, Albert Bandura, a

professor of psychology at Stanford University originally trained as a behaviorist, created his

social learning theory, which pulls both sides of the debate into a comprehensive umbrella of

reciprocal determinism, positing that personal (internal) factors, behavior, and environmental

factors have reciprocal influences on each other in human functioning (Bandura, 1977a).

Personal factors include a person's knowledge, beliefs, skills, expectations, and attitudes.

According to Bandura, these personal factors are "only potentialities that do not operate as

influences unless they are activated" (Bandura, 1977a, p. 195). Behavior is defined as the

activation of those personal factors, as "people who can converse knowledgeably about certain

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issues can affect others if they speak, but not if they remain silent, even if they possess the means to do so" (p. 195). At the same time, the environment influences behavior, and behavior influences the environment. As an example, Bandura shared the example of an experiment conducted by a researcher comparing learning among typically-developing children and children who have schizophrenia, noting that typically-developing children could create highly rewarding conditions for themselves by quickly learning how to manipulate the environment to their advantage, while children with schizophrenia, who did not figure out how to manipulate the environment, found the same environment to be stark, unrewarding, and unpleasant. Similarly, in the instructional setting of a mathematics classroom, teachers' views of their students shape instructional decisions,

> including the challenge of the tasks they pose to students, the extent to which they maintain or decrease the challenge of the tasks over the course of a lesson, and the extent to which they elicit and build upon a wide range of students' thinking in whole-class discussions. (Cobb et al., 2018, p. 59)

Bandura (1977a) further demonstrated that identical environmental outcomes can have different behavioral effects depending on why the person believes they occurred. The danger he identified here is that people are more apt to hold onto their beliefs even when actual consequences contradict them and acting on these erroneous beliefs can actually shape how others behave and change the environment. Boston (2012) found similar results in math classes, in that teachers' beliefs about students' capabilities highly influenced students' opportunities to learn math by setting parameters around the rigor of tasks for which students were held accountable. Students responded to the teacher's behavior by meeting those expectations and not

going beyond, thus reinforcing the teacher's beliefs about students' abilities. The impact of teachers' beliefs about students was critical to examine in this dissertation, as numerous researchers in the field of education across content areas concur that teachers' beliefs are the most powerful influence on what instructional choices are made (Cobb et al., 2018; Gay, 2010; Jackson, Gibbons, & Sharpe, 2017; Karabenick & Noda, 2004; McLaughlin & Talbert, 1993; TNTP, 2018; Werneck De Almeida, 1999).

In 1986, Bandura evolved social learning theory into social cognitive theory by fleshing out personal factors with the addition of the construct of self-efficacy. Schunk and Pajares (2002) described Bandura's (1986) key argument related to self-efficacy, noting that

> how people behave can often be better predicted by the beliefs they hold about their capabilities, which he [Bandura] called self-efficacy beliefs, than by what they are actually capable of accomplishing, for these self-perceptions help determine what individuals do with the knowledge and skills that they have. (p. 18)

The three elements of reciprocal determinism within Bandura's (1986) social cognitive theory take into account all of the pieces that need to be considered in order to change teacher behaviors and ultimately student outcomes, and align closely with the three concepts being investigated in this study: understanding how middle school math teachers perceive (a) English Learners' abilities to participate in rigorous, grade-level math instruction in the age of Common Core Mathematics and their capacity as teachers to provide such instruction (personal factors), (b) the impact of these beliefs on the instructional choices they make (behavior), and (c) what they feel they need at the school and district level in order to support their development as culturally and linguistically responsive teachers who successfully implement the Common Core Mathematics

Standards (environmental factors). This study distinguished between teachers' beliefs about their EL students' capabilities in math and their beliefs about their own abilities to teach ELs in order to understand which is the more powerful influencer of behavior and how professional development can support teachers in developing more productive views of students' mathematical capabilities.

Bandura's (1986) theory alone, however, is not sufficient for understanding the behavior of teachers in this study, and so a conceptual framework has been developed that also includes the frameworks of culturally and linguistically responsive teaching as well as mathematics teachers' knowledge, perspectives, and practice. The framework of culturally responsive teaching includes personal factors that value the culture, knowledge, prior experiences, and language that students bring from home, and behaviors such as using this cultural knowledge to guide curriculum development, classroom climate, instructional strategies, and relationships with students (Cobb et al., 2018; Gay, 2018; Hollie, 2018). The framework of linguistically responsive teaching strengthens cultural responsiveness by adding a layer of personal factors that encompasses understanding the importance of learning about students' backgrounds and strategies for how to do so; a deep understanding of how students learn a second language and how to apply that knowledge to instruction; the ability to identify the linguistic features and demands of academic tasks, including key vocabulary and the linguistic expectations for successful completion of tasks; and a repertoire of strategies to scaffold instruction to make it accessible and comprehensible (Lucas & Villegas, 2013).

The added complexity of understanding teachers' behaviors in the context of Common Core mathematics requires one final framework, that of mathematics teachers' knowledge,

perspectives, and practice (Cobb et al., 2018). This framework includes general knowledge about math, such as that needed to pass the Graduate Record Examination (GRE); mathematical knowledge for teaching; a vision of what high-quality math instruction looks like (rigor of the task, classroom discourse, role of the teacher vs. role of the student in who has responsibility for doing the thinking, and student engagement in the activity); and views of students' mathematical capabilities, which shape teachers' instructional decisions regarding the challenge of the tasks they pose to students and the extent to which they maintain or decrease the challenge of a task over the course of a lesson. Table 1 maps how Bandura's (1986) social cognitive theory aligns with frameworks for culturally and linguistically responsive teaching and mathematics teachers' knowledge, perspectives, and practice.

Table 1
*Conceptual Framework Alignment*

| Elements of Social Cognitive Theory[a] | Culturally and Linguistically Responsive Teaching [b] | Mathematics Teachers' Knowledge, Perspectives, and Practice [c] |
|---|---|---|
| **Personal Factors**<br><br>Knowledge<br><br><br><br>Expectations<br><br><br><br>Beliefs/<br><br>Attitudes | • Second language learning<br>• Relationship between language and academic skills (linguistically responsive teaching)<br>• Bilingual bicultural education<br>• Assessment of English Learners<br>• Self-efficacy<br>• Approaches to teaching: mastery (growth mindset) versus performance (fixed mindset)<br>• Teacher attitudes towards English Learners<br>• Teacher beliefs about English Learners' parents | General knowledge about math vs. Mathematical Knowledge for Teaching<br>• Teacher understands fractions versus teacher understands how students make sense of fractions, their common misconceptions, and how to represent key ideas of fractions to students (Cobb et al., 2018)<br>Vision of High-Quality Mathematics Instruction<br>• Aspirational, improvement goal<br>• Dialogic versus "teacher lecturer" view of instruction<br>Views of Students' Mathematical Capabilities<br>• Productive views—attribute student difficulty to instructional and/or schooling opportunities<br>• Unproductive views—attribute student difficulty to inherent traits of the student, family, or community |
| **Behavioral Factors** | • English Learners and classroom resources and time on instructional tasks<br>• English Learners and collaborative instructional approaches<br>• Interactions between English Learners and non-English Learners in the classroom | "Teachers' views of their students shape the instructional decisions they make in their classrooms, including the challenge of the tasks they pose to students, the extent to which they maintain or decrease the challenge of the tasks over the course of a lesson, and the extent to which they elicit and build upon a wide range of students' thinking in whole-class discussions." (Cobb et al, 2018, p. 59)<br><br>Central behaviors of ambitious and equitable instruction (Cobb et al., 2018) |
| **Environmental Factors** | • School climate for English Learners<br>• General sociocultural attitudes<br>• Bilingual resources<br>• District and school level comprehensive supports put in place to support teachers' beliefs about and efficacy in meeting the needs of English Learners [d] | Teachers' beliefs about students' capabilities highly influence students' opportunities to learn math by setting parameters around the rigor of tasks for which students are held accountable. Students respond to the teacher's behavior by meeting those expectations and not going beyond, thus reinforcing the teacher's beliefs about students' abilities. (Boston, 2012)<br><br>Coherent Instructional System<br>• School Leaders' practices as instructional leaders in mathematics<br>• District leaders' practices in supporting the development of school-level capacity for instructional improvement |

Table 1 (*con't*)
*Conceptual Framework Alignment*

*Note.* Adapted from [a] *Social Foundations of Thought and Action: A Social Cognitive Theory*, by A. Bandura, 1986, Englewood Cliffs, NJ: Prentice Hall. Copyright 1986 by Prentice Hall; [b] "Cultural Diversity and Multicultural Education" by G. Gay, 2013, *Curriculum Inquiry*, *43*(1), p. 48–70. Copyright 2013 by Routledge, Taylor and Francis Group on behalf of the Ontario Institute for Studies in Education; "Misconceptions about Teaching English Language Learners" by C. Harper & E. de Jong, 2004, *Journal of Adolescent and Adult Literacy, 48*(2), 152-162. Copyright 2004 by International Reading Association; *Culturally and Linguistically Responsive Teaching and Learning: Classroom Practices for Student Success,* by S. Hollie, 2018, Huntington Beach, CA: Shell Education. Copyright 2018 by Shell Education; "Professional Development Implications of Teachers' Beliefs and Attitudes Toward English Language Learners," by S. A. Karabenick & P.A.C. Noda, 2004, *Bilingual Research Journal*, *28*(1), 55-75. Copyright 2004 by Routledge; "Toward a Theory of Culturally Relevant Pedagogy," by G. Ladson-Billings, 1995, *American Educational Research Journal*, *32*(3), 465–491. Copyright 1995 by SAGE Publications; "Linguistically Responsive Teacher Education: Preparing Classroom Teachers to Teach English Language Learners," by T. Lucas, A. M. Villegas & M. Freedson-Gonzalez, 2008, *Journal of Teacher Education 59*(4), 361-373. Copyright 2008 by Corwin Press, Inc.; "A Framework for Linguistically Responsive Teaching," by A. M. Villegas & T. Lucas, 2011, *Teacher Preparation for Linguistically Diverse Classrooms: A Resource for Teacher Educators*, 55-72. Copyright 2010 by Routledge; "What are We Seeking to Sustain through Culturally Sustaining Pedagogy? A Loving Critique Forward" by D. Paris & H. S. Alim, 2014, *Harvard Educational Review, 84*(1), 85-100. Copyright 2014 by Harvard Education Publishing Group; [c] "Assessing Instructional Quality in Mathematics," by M. Boston, 2012, *The Elementary School Journal, 113*(1), 76-104. Copyright 2012 by University of Chicago Press; *Systems for Instructional Improvement: Creating Coherence from the Classroom to the District Office* by P. Cobb, K. Jackson, E. Henrick, T. M. Smith & the MIST Team, 2018, Cambridge: Harvard Education Press. Copyright 2018 by Harvard Education Press; [d] "How School and District Leaders Support Classroom Teachers' Work with English Language Learners," by A. M. Elfers & T. Stritikus, 2014, *Educational Administration Quarterly*, *50*(2), 305-344. Copyright 2014 by The University Council for Educational Administration; "Site-based Leadership for Improving Instruction" by A. Jaquith, 2015, *Educational Forum, 79*(1), 12-23. Copyright 2015 by Kappa Delta Pi; "Principal-teacher Interactions: How Effective Relationships Shape Principal and Teacher Attitudes" by H. Price, 2012, *Educational Administration Quarterly, 48*(1), 39–85. Copyright 2012 by The University Council for Educational Administration; "How Principals and Peers Influence Teaching and Learning," by J. Supovitz, P. Sirinides & H. May, 2010, *Educational Administration Quarterly, 46*(1), 31-56. Copyright 2010 by The University Council for Educational Administration; "Leading Inclusive ELL: Social Justice Leadership for English Language Learners" by G. Theoharis & J. O'Toole, 2011, *Educational Administration Quarterly*, *47*(4), 646-688. Copyright 2011 by The University Council for Educational Administration; "Principal Leadership for Professional Development to Build School Capacity," by P. Youngs & M. B. King, 2002, *Educational Administration Quarterly, 38*(5), 643-670. Copyright 2002 by The University Council for Educational Administration.

As Table 1 demonstrates, environmental factors round out Bandura's (1986) three prongs of reciprocal determinism by influencing personal factors and behaviors. This is especially important in how they influence teachers' beliefs about English Learners and their ability to participate in rigorous mathematics instruction in the age of Common Core, as well as their own self-efficacy in teaching English Learners, which then influences the choices they make when responding to student needs. The leadership and support provided at the school and district level

is critical in developing teachers with the appropriate mindsets, resources, and instructional strategies to feel self-efficacious in meeting the needs of English Learners.

## Significance

Jackson, Gibbons, and Sharpe (2017) commented that "the gulf between a vision of high-quality instruction and conventional teaching is vast" (p. 3). Both the research and my personal experience as an educator mirrored this sentiment, in that though teachers supposedly know what to do in order to provide rigorous, standards-based instruction for all students, actual behavior does not reflect aspirations, and the nagging question is why:

> What would it take to support teachers in coming to view students' difficulty as an issue of instruction and learning to respond to such difficulty by enacting supports that enable students to participate more fully in rigorous mathematical activity? (Jackson et al., 2017, p. 3)

The literature was full of studies of the school structures and pedagogical shifts that need to be in place to effectively teach English learners and the Common Core Standards for Mathematics, but it is quite a bit leaner in the areas of (a) instruments to assess teachers' instructional visions, their views of their students' mathematical capabilities, and their instructional practice, and (b) how to use those assessments to develop professional learning to ensure that (a) teachers have productive views of their students' mathematical capabilities and provide rigorous, standards-based mathematics instruction for English Learners (Cobb et al., 2018; Jackson et al., 2017). Developing productive views of students' abilities is critical, "because the racialized social system is embedded in all decisions that educators make, [and] nothing short of a concerted, self-conscious intervention would alter the state of affairs"

(Leonardo, 2013, p. 17). This idea also mirrors Freire's (1970) and Darder's (2015) work in insisting that schools and districts break through the banking mentality (Freire, 1970) and change the role of educators to be one that creates critical thinkers that can question the world as it is and work towards its transformation into one that is more socially just (Darder, 2015).

Researchers studying the content areas of elementary reading reform and science teachers' development support Jackson et al.'s (2017) hypothesis that "attending to teachers' views of their students' capabilities when implementing any ambitious instructional reform is necessary, regardless of the subject area" (p. 38). Positioning this study in secondary math has additional implications, however, such as the critical need to develop a citizenry competent in math (Creek, 2017; Frankenstein, 1983; Paulos, 1988). Marilyn Frankenstein (1983) wrote in her analysis of mathematics education through the lens of Paolo Freire's (1970) epistemology:

> Knowledge of basic mathematics and statistics is an important part of gaining real, popular, democratic control over the economic, political and social structures of our society. Liberatory social change requires an understanding of the technical knowledge that is too often used to obscure economic and social realities. When we develop specific strategies for an emancipatory education, it is vital that we include such mathematical literacy. (p. 315)

This study adds to the body of research by adding the voices of middle school math teachers to illuminate: (a) how they perceive and respond to the needs of English Learners in their classes; (b) how they feel about their abilities as educators; and (c) the supports they need to become culturally and linguistically responsive in their teaching. The reciprocal relationships

between personal, behavioral, and environmental factors will be investigated in the hope of identifying the most powerful levers for improving outcomes for English Learners.

## Method

This study was a sequential mixed methods (QUAN-qual) study that utilized quantitative survey data to describe teacher beliefs, followed by qualitative interview data to illuminate the survey data (Creswell, 2009). The study was designed to describe how teacher beliefs about their English Learner students and about their capacity to effectively teach mathematics to English Learners directly impact the instructional choices they make. It began with a survey of all the middle school math teachers in one district, and was then followed by interviews with selected teachers from that same participant pool. The quantitative survey allowed for describing teachers' beliefs, and the follow up qualitative interviews created an opportunity to dig deeper to understand teachers' perceptions and what types of professional development they thought were necessary to improve their practice.

### Context

This study focused on two middle schools in a Southern California school district. The two middle schools participated for two years with a statewide collaborative focused on increasing access to and use of academic language for secondary students with a focus on changing middle school teachers' mindsets to see building academic discourse as the responsibility of all teachers, not just those who teach English Language Development.

As part of the district's participation in this collaborative, a district-wide survey of middle school teachers was conducted at the beginning of the 2018-2019 school year. All teachers were surveyed regarding their level of comfort with and frequency of implementation of academic

discourse strategies, and although all content area teachers demonstrated some discrepancies between confidence in incorporating academic discourse in their instruction and the actual frequency of implementation, the math department results showed the largest discrepancy between the two. Because of the shifts in the language demands and expectations of the Common Core State Standards in Math, the low achievement scores in comparison to other content areas, and the wide discrepancies between teacher beliefs and behaviors, math instruction was selected as the focus of this study.

**Participants**

The participating school district has two middle schools with similar student populations comprised of 72% Latino, 8% African American, 6% Asian, and 3% White students. Additionally, 85% of students identify as low-income, and the schools range from 18% to 26% English Learners.

Participants for the survey included all middle school math teachers (N = 16), 81% of whom have taught math for 11 or more years. The demographic distribution of the teachers was: 31% Hispanic, 38% White, 19% Asian, and 13% Black. Five teachers participated in the follow up semi-structured interviews and represented both schools and all three grade levels.

**Procedures**

First, I distributed an electronic survey to all middle school math teachers in the district. The survey was distributed during a professional development session and teachers were given time to complete it on site. Following the survey, I recruited five teachers for follow-up interviews. The teachers represented the three grade levels and two schools. With these teachers,

I conducted semi-structured interviews in person or by phone, lasting about 30 minutes each. One teacher opted to answer the interview questions via email.

**Instruments**

  **Survey**. The survey was based on a thorough review of the literature, including an intensive review of pre-existing scales measuring concepts related to teaching English Learners. Based on these measures, the survey was developed and included 28 items measuring beliefs about English Learners in general, perceptions of self-efficacy in teaching in general and in mathematics, beliefs about students' capabilities in math, and the school and district supports teachers believe they need to teach English Learners effectively. Each construct in the survey was adapted from surveys already validated in the literature.

  Specifically, the survey was comprised of questions adapted from previous surveys on (a) English Learners and their abilities to participate in rigorous, grade-level math instruction in the age of Common Core Mathematics (Byrnes & Kiger, 1994; Gann, Bonner, & Moseley, 2016; Polat & Mahalingappa, 2013; Reeves, 2006; Ritter, Boone & Rubba, 2001; Spies, Lyons, Huerta, Garza & Reding, 2017; Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998); (b) teacher beliefs about their own self-efficacy in teaching in general and in math (Enochs, Smith & Huinker, 2000; Tschannen-Moran & Hoy, 2001; Tschannen-Moran & Hoy, 2007; Tschannen-Moran et al., 1998; Wilkerson et al., 2017); and (c) environmental factors impacting teacher practice (Byrnes & Kiger, 1994; Gann et al., 2016; Reeves, 2006; Tschannen-Moran et al., 1998), as well as research regarding the district and school supports necessary for comprehensive school reform (Cobb et al., 2018; Ruffalo, 2018). See Appendix A: Survey Questions.

Participants were asked to indicate their degree of agreement to statements using a 5-point Likert scale (ranging from 1, for "strongly disagree," to 5, for "strongly agree"). The instrument also included an open-ended portion for participants to prioritize needs for comprehensive supports to improve their practice in meeting the needs of English Learners.

Interviews. Interview questions were developed from the literature regarding teachers' beliefs about high quality mathematics instruction (National Council of Teachers of Mathematics [NCTM], 2014) and teachers' behaviors in how they respond instructionally to English Learners (Flores & Smith, 2009; Gann et al., 2016; Jackson et al., 2017; Spies et al., 2017). Semi-structured interviews were conducted to better understand divergent beliefs and practices, and the variation in frequency/agreement within the same construct.

**Analysis**

Due to the purpose of the study and small population size, descriptive statistics were used for survey data analysis, which provided a summary of middle school teachers' beliefs regarding English Learners' abilities to participate in rigorous, grade-level math instruction in the age of Common Core Mathematics; how they perceive their capacity as teachers to provide such instruction; and the school and district level supports they believe are necessary for success. The interview questions were used to flesh out the findings from the survey results and better understand the context in which these teachers work and the instructional decisions they make. Both were analyzed through the lens of Bandura's (1977a, 1977b) work on reciprocal determinism and self-efficacy and Karabenick and Noda's (2004) knowledge, attitudes, beliefs, and behaviors that impact teachers' delivery of quality instruction for English Learners. The three elements of reciprocal causation theory are personal factors, behavior, and environmental

factors. Bandura's (1977a, 1986) personal factors link to Karabenick and Noda's (2004) constructs of teacher beliefs about English Learners' parents, the relationship between language and academic skills (interpreted here as culturally and linguistically responsive teaching), and teacher attitudes toward English Learners. Bandura's (1977a, 1986) second element, behavior, covers Karabenick and Noda's (2004) construct of teacher efficacy, and finally, environmental factors from Bandura's (1977a, 1986) model match Karabenick and Noda's (2004) constructs of English Learners and classroom resources, and school climate for English Learners.

## Limitations

The limitations of this study were my position as a senior leader who oversaw programs for English Learners in the school district where the study took place. This may have negatively affected the teachers participating in this study, who might have felt compelled to provide socially acceptable responses and/or agree with my assumptions despite their true feelings.

## Delimitations

This study was limited specifically to math due to its identification as the gatekeeper subject that most often hinders students' access to post-secondary education, the study district's low achievement scores on the California Assessment of Student Performance and Progress (CAASPP) in math, and pedagogical debates that persist amongst math teachers both nationally and as identified in a previous survey administered in the district. This study focused mainly on teacher beliefs rather than on specific pedagogical shifts, with the intent of looking for congruence between this district and what Cobb et al. (2018) found in their study, that knowing what to do isn't enough; believing in student capacity to learn and responding to student difficulty in productive ways is key to changing student achievement in math.

**Organization of Dissertation**

Chapter 1 provided an overview of the study, its purpose, and significance. Chapter 2, the literature review, discusses the topics of culturally and linguistically responsive teaching, competencies for effective math teachers, and resources that influence student learning. Bandura's (1986) social cognitive theory (SCT) was utilized as an organizing principle, aligning each of these topics with SCT's three elements of reciprocal determinism: personal factors, behavior, and environmental factors. Chapter 3 provides the study's methodology, which includes a description of the research design, sampling, instruments, procedures, and data collection. Chapter 4 provides the findings of the study from an analysis of the quantitative and qualitative data. Chapter 5 provides a discussion of the findings in relation to the literature as well as recommendations for future research and practice. Three appendices follow the reference section: Appendix A: Survey Instrument; Appendix B: Semi-structured Interview Design; and Appendix C: Standards for Mathematical Practice from the Common Core State Standards for Mathematics.

# CHAPTER 2

## REVIEW OF LITERATURE

English Learners are a large and rapidly growing segment of the United States' student population, comprising 20.4% of the total enrollment in California public schools California Department of Education (2019). They are also increasingly diverse in their experiences with both the American educational system and with English, including well-educated newcomers, newcomers with little or interrupted schooling, and long-term English Learners, who are U.S. born but still struggling with English language proficiency. By 2024, it is projected that more than 56% of students in the US will be students of color, while 82% of elementary and secondary teachers and 80% of school leaders identify as White (U.S. Department of Education, 2016). In order to address this growing diversity gap between teachers and students, all teachers need to become culturally and linguistically responsive. Of the three methods for increasing the number of culturally and linguistically responsive teachers proposed by Martin and Strom (2016), increasing teacher knowledge of the specific pedagogical shifts that are needed to bridge the gaps for English Learners, diversifying the workforce to include more teachers of color who can relate to the experiences of English Learners, and incorporating reflective practices into teacher professional development to help them gain a better understanding of their own cultural identities as well as those of their students, incorporating reflective practices is the most powerful lever, as teacher beliefs determine whether instructional change actually takes root. Building these beliefs through a school and districtwide comprehensive approach is critical, especially for math teachers, who are facing unprecedented language demands due to the

adoption of the Common Core State Standards in addition to the rapidly diversifying student population.

The problem this study addressed was how to support secondary mathematics teachers in creating high-quality professional development that will increase knowledge of quality educational services for English Learners and positively impact attitudes, beliefs, and behaviors towards this student population such that they are included and effectively supported in high-quality, rigorous mathematics instruction. In order to address the problem, I reviewed research literature in the areas of culturally and linguistically responsive teaching, competencies for effective math teachers, and resources that influence student learning.

To assist in organizing the literature review, I employed Bandura's (1986) notion of reciprocal determinism. Bandura identified three elements of reciprocal determinism as part of his social cognitive theory: personal factors, behavior, and environmental factors. Personal factors included a person's knowledge, beliefs, skills, expectations, and attitudes, and in the case of teachers, they are about one's students as well as one's capacity to teach those students effectively (self-efficacy). The personal factors that impact teachers' delivery of quality instruction for English Learners were identified by Karabenick and Noda (2004) as teacher attitudes towards English Learners, beliefs about English Learners' parents, approaches towards teaching, and the relationship between language and academic skills. For the purposes of this research, these constructs were interpreted as culturally and linguistically responsive teaching, and each was examined in turn. Following the examination of personal factors, this chapter inspects the two remaining elements of Bandura's (1986) reciprocal determinism: behavior and environmental factors.

**Personal Factors: Knowledge, Attitudes and Beliefs**

Pre-service teachers attend preparation programs ostensibly to learn how to teach content to students. Consider the example of a math major enrolling to learn not about the content of mathematics, but rather how to teach mathematical concepts to secondary students. As was demonstrated in Chapter 1, however, because teaching and learning take place within the context of culture, current pre-service programs have to prepare future teachers to teach students who are very likely culturally and linguistically different from themselves, and thus they need to learn much more than how to make the quadratic formula comprehensible to teenagers. The diversity gap between White middle-class teachers and their ethnically, culturally, and linguistically diverse students is important to consider and address. Leonardo (2013) stated that "because the racialized social system is embedded in all decisions that educators make, nothing short of a concerted, self-conscious intervention would alter the state of affairs" (p. 17). Hollie (2018) agreed, imploring educators to "check their filters, question their belief systems, and listen to their deficit monitors" (p. 32) in order to become culturally and linguistically responsive teachers. This chapter will first examine teacher knowledge, attitudes, and beliefs regarding teaching math in general, and then break down the knowledge, attitudes, and beliefs for teaching math to English Learners.

**Teacher Knowledge, Attitudes, and Beliefs Regarding Teaching Math**

The literature identified three key competencies that effective math teachers need to develop: (a) mathematical knowledge for teaching; (b) a vision of what high-quality math instruction looks like; and (c) views of students' mathematical capabilities (Cobb et al., 2018). Mathematical knowledge for teaching is distinguished from general knowledge about math such

as that needed to pass the Graduate Record Examination (GRE) and that which is needed to teach mathematical concepts to someone else. A vision of high-quality mathematics instruction is in alignment with the tenets of the California Common Core State Standards: Mathematics (CDE, 2013) and includes components such as the rigor of the task, classroom discourse, the role of the teacher versus the student (in who has responsibility for doing the thinking), and student engagement in the activity (Cobb et al., 2018; TNTP, 2018). Despite the adoption of the Common Core State Standards in mathematics, there is not universal acceptance of the teaching practices they espouse, and this adds another layer of complexity for teachers. Munter, Stein, and Smith (2015) detailed the debate between proponents of dialogic versus direct instruction in the mathematics community, and where one's vision falls on that continuum has a direct impact on the quality of instruction students receive.

Views of students' mathematical capabilities were defined by Cobb et al. (2018) as either productive or unproductive. Productive views attribute student difficulty to instructional and/or schooling opportunities, whereas unproductive views attribute student difficulty to inherent traits of the student, family, or community. The attribution of student difficulties has a direct correlation with how teachers respond, which will be addressed in the discussion of behavioral factors in this chapter.

In assessing the influence of each competency, researchers found that mathematical knowledge for teaching was important, but focusing on it alone did not improve practice.

Focusing on a sophisticated vision of instruction was also important and highly correlated with the level of rigor of tasks introduced, but not so with classroom discussions, and visions tended to be aspirational rather than what was actually taking place. Views of students'

mathematical capabilities, however, were critical, as they had a large influence on developing ambitious and equitable instructional practices as well as how they responded to struggling learners (Cobb et al., 2018):

> Teachers' views of their students shape the instructional decisions they make in their classrooms, including the challenge of the tasks they pose to students, the extent to which they maintain or decrease the challenge of the tasks over the course of a lesson, and the extent to which they elicit and build upon a wide range of students' thinking in whole-class discussions. (p. 59)

The expectation with the Common Core standards is that they be accessible to all learners, and teachers are expected to ensure that students such as English Learners have equitable access to rigorous learning opportunities in math (Ruffalo, 2018). Thus believing that students who are English Learners are capable of learning rigorous mathematics is a key lever in improving their achievement in math, particularly because the field of mathematics is ruled by what Louie (2017) termed as math's historical "culture of exclusion," which narrowly limits opportunities for many students to develop identities as "mathematically capable learners and thinkers" (p. 489). This exclusionary belief that only some people can be successful in mathematics was confirmed by Anderson, Boaler, and Diekmann's (2018) findings that math professors have the most fixed mindsets about mathematics ability of any STEM field and were most likely to believe that students required a "gift" to be successful in their classes (p. 2).

Teachers with a fixed mindset focus on inflexible performance targets that demonstrate ability or lack thereof, and compare students against each other (Dweck, 2016; Lauermann, 2014). They are more likely to group students as high- and low-achievers and are less likely to

feel obligated to adapt their instructional strategies to meet the needs of culturally diverse learners (Kumar & Hamer, 2013). This mindset does not boost feelings of responsibility for student outcomes and may actually reduce student motivation (Kumar & Hamer, 2013; Kumar, Karabenick, & Burgoon, 2015). Cobb et al. (2018) found that teachers with a fixed mindset were more likely to have unproductive explanations as to why their students had challenges in math, attributing them to inherent traits of the student, family, or community, and to respond by reducing the rigor of the learning goals for students having difficulty.

In contrast, teachers with a growth mindset see student achievement as malleable and focus on learning and providing pathways to mastery, communicating that success equals improvement in understanding. This belief influences their behaviors in such ways as to

boost their feeling of being responsible for educational outcomes (e.g. for student achievement) and, consequently, impact their behavior in terms of such educational practices as encouraging students' motivation, supporting and assisting students where they stumble, recognizing their effort and emphasizing their personal improvements (i.e. mastery-oriented practices). (Matteucci, Guglielmi, & Lauermann, 2017, p. 290)

Teachers with a growth mindset also engage in productive explanations that attribute student difficulty to school or learning opportunities and make productive adjustments such as careful planning for the introduction of cognitively challenging tasks to ensure that all students can participate (Cobb et al., 2018). Teachers who embrace a growth mindset with English Learners are more likely to be comfortable with diverse students, to be able to be reflective about personal prejudices and stereotypical beliefs, to emphasize collaboration and mutual respect among students, and to accept students' abilities (Kumar & Hamer, 2013).

**Teacher Knowledge, Attitudes and Beliefs Regarding Teaching English Learners**

Researchers at TNTP (2018) identified four resources that influence student achievement: (a) consistent opportunities to work on grade-appropriate assignments; (b) strong instruction that requires students to do most of the thinking; (c) deep engagement in learning; and (d) teachers who hold high expectations for students and believe that they can meet grade-level standards. TNTP's nationwide study noted that not only are these four resources infrequently provided for most students, but they are particularly lacking for students of color, those from low-income families, English Learners, and students with mild to moderate disabilities. Cobb et al. (2018) had similar findings, noting that

> Teachers who developed sophisticated visions of instructional quality and were provided ongoing support to develop an ambitious and equitable vision of instruction did not develop the intended forms of practice *unless they viewed their students from historically marginalized populations as capable of engaging in rigorous problem solving*. (p. 58, emphasis added)

Reasons for teachers' beliefs about the abilities of historically marginalized populations identified in the literature include attitudes about race, language proficiency, and socioeconomic status (Ajayi, 2011; Flores & Smith, 2009; Kumar et al., 2015). Ajayi (2011) posited that "teachers deploy their cultural and ethnic identity to interpret their role as educators. They mediate their understanding of students' learning needs and their own practice in light of their sociocultural backgrounds and what they know and believe" (p. 664). This can be particularly damaging if teachers ascribe to a cultural deficit model (Valenzuela, 1999) regarding certain groups of students, and negative orientations toward English Learners include perceiving them as

more burdensome than fluent students; blaming the victim and finding fault with English Learner students, their families, and their communities; viewing language as a problem; and privileging one language while stigmatizing the other (Flores & Smith, 2009). To combat these negative mindsets, researchers have identified *culturally and linguistically responsive* practices necessary for all teachers to develop.

**Principles of culturally responsive pedagogy.** Hollie's (2018) term of *culturally and linguistically responsive teaching and learning* is one of several under the umbrella of culturally responsive pedagogy, a term that continues to evolve from the pioneering work of Gloria Ladson-Billings (1995), who defined *culturally responsive teaching* as "a pedagogy that empowers students intellectually, socially, emotionally, and politically by using cultural and historical references to convey knowledge, to impart skills, and to change attitudes" (1994, p. 13).

Gay (2000) built upon this model for teaching African-American students, expanding to include all students of color, and advocated for *culturally responsive pedagogy*, teaching "to and through" the personal and cultural strengths, intellectual capabilities, and prior accomplishments of students of diverse ethnic groups (p. 32). Gay's paradigm valued the culture, knowledge, prior experiences, and language that students bring from home, and used this cultural knowledge to guide curriculum development, classroom climate, instructional strategies, and relationships with students, recognizing that their responses to their students' struggles were important for ensuring that they persevered toward high levels of academic success. Gay has continued to develop the notion of culturally responsive pedagogy since introducing it in 2000. In the third edition of her book (2018), she argued that teachers who want to break the cycle of underachievement for

students of color need to understand that (a) the structures of schooling in the United States are strongly rooted in European and middle class origins, and students who do not think, act, speak or believe in these invisible governing principles of mainstream culture find themselves at an extreme disadvantage; (b) the paradigm of deficit thinking regarding improvement programs for students of color is doomed to failure; (c) good intentions without pedagogical knowledge and skills are not sufficient to dismantle the status quo; and (d) cultural diversity is a strength.

Following Gay's introduction of culturally responsive teaching in 2000, Hollie's (2018) proposed the notion of *cultural and linguistic responsiveness* ,which he defined in the second edition of his book as "the validation and affirmation of the home (indigenous) culture and home language for the purposes of building and bridging the student to success in the culture of academia and mainstream society" (Hollie, 2018, p. 23).

Paris and Alim (2014) critiqued the previous iterations of culturally responsive pedagogy, arguing that they perpetuated the importance of the dominant culture and language by using students' home language and culture as a bridge to success in that dominant culture and language, rather than valuing both equally. They created *culturally sustaining pedagogy*, which "seeks to perpetuate and foster—to sustain—linguistic, literate, and cultural pluralism as part of the democratic project of schooling and as a needed response to demographic and social change" (p.14).

Alongside the evolution of culturally responsive pedagogy since Ladson-Billing's pioneering work in 1995, the US has been experiencing exponential growth in the number of students in the K-12 system who speak a language other than English. In the decade from 1990 to 2000, the enrollment of English Learners increased by 105%, compared to a much lower 12%

overall enrollment gain (Lucas et al., 2008), causing the parallel realization of mainstream teacher preparation programs that they needed to adapt to adequately prepare teachers as *linguistically responsive* with essential understandings of and pedagogical expertise in second language learning (Harper & de Jong, 2004; Lucas et al., 2008; Villegas & Lucas, 2011). While culturally responsive pedagogy valued students' home languages, it did not provide a framework comprehensive enough to fully include teaching English Learners. To fill that gap, the concept of *linguistically responsive teaching* was developed, defining such teachers as those who understand that simply exposing English Learners to English combined with some visuals and graphic organizers and the "Just Good Teaching" (JGT) pedagogy used with all students was not sufficient to support their learning (Harper & de Jong, 2004).

**Principles of linguistically responsive teaching.** Just as culturally relevant pedagogies have evolved over time as researchers re-examined the literature with a critical eye, so too has linguistically responsive teaching grown in understanding. It began with the identification of six essential understandings of second language learning (Lucas et al., 2008), which were clearly absent from culturally relevant pedagogy (CRP), and then moved closer in alignment to CRP, highlighting sociolinguistic consciousness, the valuing of linguistic diversity, and advocacy for English learners (Villegas & Lucas, 2011).  Sociolinguistic consciousness was described as the understanding of the deep connection between language, culture, and identity as well as the sociopolitical dimensions of language use, while value for linguistic diversity implied an appreciation for its development, and advocacy was defined as a desire to improve English learners' access to educational opportunities.

In its latest iteration, Lucas and Villegas (2013) added specific strategies to flesh out how to actually put linguistically responsive teaching into practice. Understanding the importance of learning about students' backgrounds implied that linguistically responsive teachers have a worldview that values students' home languages as resources and assets. Further, this worldview allows teachers to understand their own cultural biases and attitudes towards those who do not speak English. Linguistically responsive teachers get to know their students' communities in order to understand the different background knowledge and experiences they have regarding classroom interactions, literacy, cultural identity, race, and social class. Finally, linguistically responsive teachers recognize these differences as assets and use them as building blocks for developing mutual understanding and learning (Harper & de Jong, 2004). This asset-based approach lines up squarely with culturally relevant pedagogy as defined by Ladson-Billings (1995), Gay (2000, 2013), and Hollie (2018). The remaining three categories delved deeper into second language acquisition, layering on additional necessary knowledge for teachers of English Learners.

The second category—a deep understanding of how students acquire language and how to apply that knowledge to instruction—means that linguistically responsive teachers understand what is developmentally normal for English Learners. Linguistically responsive teachers understand the necessity of simultaneously developing reading, writing, listening, and speaking skills instead of delaying literacy instruction until language proficiency reaches a certain level; and the role that primary language plays when assessing students' writing (Harper & de Jong, 2004).

The third category—the ability to identify the linguistic features and demands of academic tasks—includes an understanding of the language demands inherent in the learning tasks that students are expected to carry out in class; how to integrate language and content objectives in the same lesson, and skills for using appropriate scaffolding so that ELLs can participate successfully in those tasks (Harper & de Jong, 2004; Lucas et al., 2008).

The final category—having a repertoire of strategies to scaffold instruction to make it accessible and comprehensible—includes understanding how students' prior literacy experiences influence their needs and how to bridge the gaps; how to use visuals, graphic organizers, primary language support, and clear and explicit instructions; how to supplement and modify oral language and written texts, and how to interpret assessment results in the context of students' stages of language proficiency (Harper & de Jong, 2004; Lucas et al., 2008). Table 2 summarizes this evolution of thought.

Table 2

*Essential Understandings, Categories, and Orientations of Linguistically Responsive Teachers*

| Essential understandings of second language learning critical for teachers[a] | Orientations of linguistically responsive teachers[b] | Putting linguistically responsive strategies into practice[c] |
|---|---|---|
| • Fundamental differences between social and academic language and the time needed for the development of each<br>• Necessity for comprehensible input that is just beyond English Learners' current level of language proficiency<br>• Critical role played by social interaction in the development of English Learners' conversational and academic language<br>• Difference between the likelihood of English Learners with strong native language skills developing strong English proficiency versus those with weak native language skills<br>• Importance of creating a safe, welcoming environment with minimal anxiety<br>• Importance of explicit attention to linguistic form and function | • Sociolinguistic consciousness<br>• Value for linguistic diversity<br>• Advocacy for English Learners | • Understanding of the importance of learning about students' backgrounds and strategies for how to do so<br>• Deep understanding of how students learn a second language and how to apply that knowledge to instruction<br>• Ability to identify the linguistic features and demands of academic tasks, including key vocabulary and the linguistic expectations for successful completion of tasks<br>• Repertoire of strategies to scaffold instruction to make it accessible and comprehensible |

*Note.* Adapted from [a] "Linguistically Responsive Teacher Education: Preparing Classroom Teachers to Teach English Language Learners" by T. Lucas, A. M. Villegas & M. Freedson-Gonzalez, 2008, *Journal of Teacher Education 59*(4), 361-373. Copyright 2008 by Corwin Press, Inc.; [b] "A Framework for Linguistically Responsive Teaching" by A. M. Villegas & T. Lucas, 2011, *Teacher Preparation For Linguistically Diverse Classrooms: A Resource for Teacher Educators*, 55-72. Copyright 2010 by Routledge; [c] "Preparing Linguistically Responsive Teachers: Laying the Foundation in Preservice Teacher Education" by *T.* Lucas & A. M. Villegas, 2013, *Theory into Practice, 52*:2, 98-109. Copyright 2013 by Ohio State University College of Education.

There was not universal agreement amongst researchers regarding exactly what teachers needed to know in order to become more linguistically responsive, what to prioritize in light of all the other demands facing teachers, and how professional development programs could best support the development of this knowledge. Bunch (2013) critiqued the expectation that teachers develop multiple understandings and orientations as unrealistic for secondary teachers of content

other than English Language Development, arguing that the key to engaging teachers in changing their practice to better support English Learners was to worry less about becoming experts in language acquisition theory and to narrow the focus to identifying and understanding the language demands of their discipline and how to make their content accessible:

> efforts to prepare teachers for working with English learners (ELs) to engage with increasing language and literacy expectations across the curriculum requires development of pedagogical language knowledge (Galguera, 2011)—not to "teach English" in the way that most mainstream teachers may initially conceive of (and resist) the notion, but rather to purposefully enact opportunities for the development of language and literacy in and through teaching the core curricular content, understandings, and activities that teachers are responsible for (and, hopefully, excited about) teaching in the first place. (p. 298)

> Though there is some disagreement on the amount and type of pedagogical knowledge secondary content teachers need in order to provide high quality instruction for English Learners, there does not appear to be disagreement in the need for valuing linguistic diversity and viewing it as an asset. Culturally and linguistically responsive teaching practices form the critical backbone of pedagogical knowledge required to provide quality instruction for English Learners, and teachers' attitudes towards English Learners are the most critical lever in influencing their instructional judgements and actions (Cobb et al., 2018; Gay, 2010; TNTP, 2018; Werneck De Almeida, 1999). These attitudes also influence teachers' receptivity to professional development efforts to improve instructional delivery for ELs and "to dispel unwarranted beliefs about language and cognition that, left unchallenged, can impede attempting

new instructional practices that are more conducive to English Learner student success"
(Karabenick & Noda, 2004, p. 56).

Bandura's (1986) social cognitive theory posits that personal (internal) factors, behavior, and environmental factors have reciprocal influences on each other in human functioning. The power of strengthening the personal factors, particularly teachers' beliefs about their students' capabilities and their own efficacy as teachers is clearly illustrated by Matteucci, Guglielmi, and Lauermann (2017):

Teachers who believed to be able to influence students' outcomes (i.e. high level of self-efficacy), who viewed students' intelligence as malleable (i.e. incremental beliefs) and who perceived their relationships with students as positive and collaborative were more likely to assume personal responsibility for educational outcomes. Furthermore, teachers who were willing to accept personal responsibility for work-related outcomes were more likely to report a sense of satisfaction with being a teacher (i.e. career-choice satisfaction), and a positive, fulfilling, work-related state of mind (i.e. work engagement). (pp. 289-290)

### Behavioral Factors

According to Bandura (1977), personal factors are "only potentialities that do not operate as influences unless they are activated" (p. 195). Behavior is defined as the activation of those personal factors. Cobb et al. (2018) identified the behaviors of math teachers based on their beliefs about their students' capabilities by observing how they responded to students who were struggling in math. Teachers who attributed student difficulty to school or learning opportunities responded with careful planning for the introduction of cognitively challenging tasks to ensure

that all students could participate, while those who attributed them to inherent traits of the student, family, or community often reduced the rigor of the learning goals for students having difficulty. Researchers at TNTP (2018) had similar findings, noting that students of color and low-income students had vastly fewer opportunities for high quality academic experiences, likely due to the fact that although 82% of teachers surveyed supported their state's academic standards, only 44% of them believed that their students could meet those standards.

Cobb et al. (2018) defined "ambitious and equitable instruction" as mathematics teaching aligned to the Common Core State Standards that supports the development of both conceptual understanding and procedural fluency for all students, including those that have been historically underserved in U.S. schools. Central teacher behaviors aligned with ambitious and equitable instruction include:

> (a) introducing cognitively demanding tasks; (b) supporting students to develop common language specific to key contextual features of a problem-solving scenario and to key mathematical ideas that were to be explored in the task; (c) expecting students to engage in mathematical discourse in small and whole groups; (d) establishing norms for explanations that include descriptions of both the steps taken to solve a problem and the rationale for taking those steps; (e) pressing students to elaborate their reasoning and to make connections between their peers' solutions and mathematical ideas; (f) coaching students to meet expectations; and (g) attributing mathematical authority to students to position students as competent and to maintain the rigor of the task. (pp. 47-50)

Teachers' implementation of ambitious and equitable instruction may be influenced not only by their beliefs about their students, but also by their beliefs in their own capacities to provide such high-quality instruction, or their feelings of self-efficacy.

**Teacher Self-Efficacy and Behavior**

Research on teacher self-efficacy is built upon the foundation created by Bandura's (1986) seminal work on social cognitive theory and self-efficacy. Bandura defined self-efficacy as a person's beliefs regarding his or her ability to affect desired outcomes in the future, which influence persistence, the ability to rebound from setbacks, and emotions (Tschannen-Moran & Hoy, 2001). More specifically, Bandura (2006) stated that:

> efficacy beliefs influence whether people think erratically or strategically, optimistically or pessimistically. They also influence the courses of action people choose to pursue, the challenges and goals they set for themselves and their commitment to them, how much effort they put forth in given endeavors, the outcomes they expect their efforts to produce, how long they persevere in the face of obstacles, their resilience to adversity, the quality of their emotional life and how much stress and depression they experience in coping with taxing environmental demands, and the life choices they make and the accomplishments they realize. (p. 309)

Bandura (1977b) identified four sources of efficacy expectations: (a) performance accomplishments, (b) vicarious experience, (c) verbal persuasion, and (d) emotional arousal. Performance accomplishments exhibit the strongest influence on efficacy expectations by raising mastery expectations with successes and lowering them with repeated failures. This highlights the importance of one-on-one coaching as part of the suite of professional development services

provided at a school site. It is also a key lever because when self-efficacy is strengthened by repeated success, it tends to generalize to similar situations. This bodes well for transference of success in one content area to another, so that a teacher who successfully implements a strategy in math class might be open to trying that same strategy in language arts.

The second source of expectations, vicarious experience, can influence efficacy expectations through observations of others performing the threatening task, but it is weaker than performance accomplishments because it does not provide information about one's own capabilities. It does, however, persuade observers that the act is achievable, since others can do it, and it is especially powerful if they see models overcoming difficulties through sustained effort rather than by those who appear to do it effortlessly. It is also more helpful to see multiple and varied models of the desired behavior than a single model. This validates the teacher spotlights that have been utilized in the district, where one teacher is invited to share their results of implementing an academic discourse strategy for 5 to10 minutes at the beginning of each staff meeting. Based on Bandura's (1977b) theory, this vicarious experience is helpful, but not sufficient, and certainly not as powerful as performance accomplishments.

Bandura's (1977b) third source of information, verbal persuasion, is defined as people being "led, through suggestion, into believing that they can cope successfully with what has overwhelmed them in the past" (p. 198). The strength of this influence is highly mitigated by the level of esteem held by the persuader, as well as its implementation not as a single strategy, but rather as a compliment to corrective performance. Thus, the principal or a coach simply telling a teacher that they can do something is not an effective strategy without providing necessary supports for successful implementation.

Emotional arousal rounds out Bandura's (1977b) source of efficacy information, as people rely on their feelings of stress and anxiety as indicators of their perceived efficacy. This highlights the importance of reducing the affective filter of participants in professional development and coaching situations.

Bandura's (1977b) work has been influential for others defining self-efficacy and examining the concept with different populations. Teachers report experiencing lower levels of comfort and efficacy when interacting with culturally diverse students, particularly English Learners (Flores & Smith, 2009; Kumar, 2006; Kumar & Hamer, 2013). These beliefs regarding their abilities to meet the needs of English Learners are also influenced by their level of experience. Results of Polat and Mahalingappa's (2013) survey of pre-service and in-service teachers demonstrated that in-service teachers had more negative beliefs than pre-service teachers about their responsibility for and ability to address the needs of English Learners. In-service and thus more experienced teachers were more likely to state that: (a) they did not have enough time to help English learner students; (b) it was the responsibility of the ESL teacher to address their needs; (c) English learners should not be expected to do much in content classes until they reach a certain level of English proficiency; and (d) English learners can be given less coursework. These results can be hypothesized to be caused by a mismatch between their expected outcomes and what actually transpired, how long they persevered, and what types of professional development and/or support was provided by the school.

The concept of self-efficacy is particularly important for this study, as researchers have found that teachers with a strong sense of self-efficacy in teaching mathematics have a strong

influence on students' motivation, particularly in the transition from upper elementary to middle school (Zee & Koomen, 2016).

### Environmental Factors and Their Influence on Personal Factors and Behavior

Bandura (1986) identified environmental factors as the third component of reciprocal determinism, both influencing and being influenced by personal factors and behaviors. Boston (2012) demonstrated this by showing that teachers' beliefs about students' capabilities highly influence students' opportunities to learn math by setting parameters around the rigor of tasks for which students are held accountable (environment). Students respond to the teacher's behavior by meeting those expectations and not going beyond, thus reinforcing the teacher's beliefs about students' abilities. Jackson et al. (2017) moved from the teacher-student relationship to the teacher-teacher relationship, studying the reciprocal impact of the school environment on teacher beliefs and behaviors, particularly the influence of colleagues on their views of their students' mathematical capabilities. They found that the culture of the school, or in the case of secondary schools, the department, had a greater impact on their views than any other aspect of the school. Supovitz, Sirinides, and May (2010) also found that peer influence had a higher direct association with change in instruction than the principal's influence, highlighting the importance of creating a culture in departments and schoolwide where culturally and linguistically responsive *teachers* are leading the work so that a culture of culturally and linguistically responsive teaching can be developed and reinforced as more experienced teachers welcome and influence their newer colleagues. As noted earlier in this dissertation, a school culture of culturally and linguistically responsive teaching is difficult to maintain when politics, views on immigration and multilingualism, and differing understandings of the psychology of human

behavior and motivation all exert their influence on teachers, leaving them unsure of which

pedagogy to follow and with fear of retribution for getting it wrong. This instability also has a

huge impact on teachers' sense of self-efficacy, which impacts the instructional decisions they

make. Thus, it is imperative that school and district leaders who serve English Learners build

healthy school cultures that improve the quality of teaching and learning (Elfers & Stritikus,

2014; Scanlan & Lopez, 2012; Theoharis & O'Toole, 2011).

Cobb et al. (2018) found that a coherent instructional program is critical for this healthy

school culture, and is comprised of (a) goals for student learning and a vision of high-quality

instruction, (b) an integrated system of supports for teachers that includes pull out professional

development, coaching, collaborative meetings, and teacher advice networks, (c) instructional

materials and assessments, and (d) supports for struggling students. For schools with English

Learners, this system must also include appropriate services for cultivating language proficiency

to academic grade level, integrating home language and culture, and developing acceptance by

all teachers of responsibility for both language and content-knowledge development for all

students (Ajayi, 2011; Scanlan & Lopez, 2012). The principal is key to developing this

coherence through his/her influence on the work environment of teachers (Elfers & Stritikus,

2014; Jaquith, 2015; Price, 2012; Supovitz et al., 2010; Theoharis & O'Toole, 2011; Youngs &

King, 2002). Effective principals demonstrate an ability to clearly communicate the mission of

the organization, establish trust, create structures that promote teacher learning through the

development of shared goals and meaningful collaboration, develop positive teacher-student and

teacher-administrator relationships, and create a culture of innovation where it is okay to make

mistakes (Hall & Hord, 2015; Youngs & King, 2002). Jaquith (2015) took this a step further and

postulated that done correctly, a principal can create conditions at a school site that not only improve teacher capacity for improving instruction, but also support the creation of new knowledge, thus becoming self-generating. This can be achieved by focusing the goals and mission of the school, encouraging a community of collaboration and principal-teacher and teacher-teacher trust, and actively supporting instructional improvement by working through and with teacher leaders.

In addition, effective principals in schools with English Learners have to ensure that teachers develop a sense of responsibility for English Learners' achievement, and this can be accomplished through influencing teachers' beliefs about students' ability, their own efficacy, and their job satisfaction in addition to creating a positive school climate (Elfers & Stritikus, 2014; Matteucci et al., 2017).

Lauermann and Karabenick (2011) defined responsibility in general as "a sense of internal obligation and commitment to produce or prevent designated outcomes or that these outcomes should have been produced or prevented" (p. 135). This sense of responsibility is influenced by: (a) internal responsibility, which is composed of a person's ability to self-regulate and sense of self-determination; (b) imposed responsibility, which comes from the outside, such as professional standards and student needs; and (c) contextual factors. The principal has an opportunity to influence teachers' sense of responsibility through addressing contextual factors such as teachers' perceptions of autonomy, where they fit in the organizational hierarchy, the clarity of their roles, the adequacy and equitable distribution of resources and information, their workload, and the level of conflict in the school.

Principals can also influence teachers' feelings of self-efficacy and control, and their perceptions of trust and organizational support (Lauermann & Karabenick, 2011) through professional development that helps teachers feel empowered to alter and shape curriculum to target the needs of their students and to feel adequately equipped and supported to successfully make such changes (Olsen, 2010). This is no small order, as in order to become culturally and linguistically responsive, "teachers must not only learn new subject matter and instructional techniques, they must also alter their beliefs and conceptions of practice, their theories of practice, and their theories of action" (Gay, 2010, p. 143). Anderson et al. (2018) argued that "for teachers to change their approach to learning, they need to change their identities as people" (p. 3), and for that to happen, teachers need to engage in analysis, reflection, and discussion about these experiences (Bunch, 2013).

Developing teachers who exemplify all the necessary skills and dispositions best suited for teaching English Learners effectively requires using strategies that enable teachers to become aware of, sensitive to, and able to incorporate cultural and linguistic diversity into their teaching practice. Participation in targeted professional development that included strategies such as reflection on learning a second language, exposure to diversity, engaging teachers in content learning in a language unfamiliar to all participants, and requiring teachers to get to know their students and communities have been found to create a positive shift in educators' beliefs and practices (Ajayi, 2011; de Oliveira, 2011; Flores & Smith, 2009; Jimenez & Rose, 2010; Polat & Mahalingappa, 2013; Spies et al., 2017). These shifts included an emphasis on English language acquisition, language enrichment activities, and active rather than passive learning environments (Flores & Smith, 2009). Other researchers have found that in order to build teacher self-efficacy,

professional development must involve a self-reflective component (Creek, 2017). This is particularly important in the field of mathematics, where teachers have demonstrated a fierce hold upon traditional teaching practices despite the introduction of new pedagogies through the adoption of the Common Core State Standards. Anderson et al. (2018) argued that this is because professional development does not address the mindset of teachers of mathematics, which is more likely to be fixed than other content areas. In their study of the Mathematical Mindset Intervention, they observed increased openness to change among teachers who engaged in professional learning focused on the intersection of mathematics teaching, brain science, and reflection upon their beliefs about themselves and about mathematics. Gutierrez (2012) developed a model of four key dimensions of equity in mathematics instruction to support teachers in reflecting upon their culturally responsive practice: (a) access to resources such as high quality mathematics teachers, a rigorous curriculum, and the opportunity to learn through active participation; (b) achievement, as evidenced by course taking patterns, trades, and standardized test scores; (c) identity, or whether or not students can draw upon their cultural and linguistic resources to be successful in math; and (d) power, or who gets to talk in class and whether or not students are given opportunities to critique society as part of learning math skills.

Gay (2018) developed practice possibilities or reflective exercises in the third edition of her seminal work on culturally responsive teaching to help educators know how to "*do* culturally responsive teaching" (p. xxxii). This developing field of reflective practice demonstrates the need for supporting teachers, particularly teachers of mathematics, in this way. Gay (2018) identified several successful models that can be built upon for making this shift, including the Math in a Cultural Context (MCC) program developed for Alaskan Natives, the Algebra Project

that was designed to improve Algebra I performance of African-American middle school students (Moses & Cobb, 2002), The Calculus Project (TCP), and the Escalante Math Program.

The elements that these culturally and linguistically responsive programs have in common are that they are grounded in the belief that a growth mindset, cooperative learning, supportive relationships with teachers, and the use of the knowledge, language, culture, and math embedded in the everyday knowledge and activities of marginalized students are the ingredients necessary for changing their academic trajectory (Gay, 2018).

The role of the school and district in providing an environment that supports and develops teachers' collective efficacy cannot be overstated. The school culture makes or breaks any initiative, as teachers collectively decide which will be implemented with fidelity and which will receive lip service and compliance only. This idea has been confirmed by Hattie's (2017) research identifying teachers' collective efficacy as having the largest effect size (1.57) of any other school factor on student achievement. This collective efficacy is also driven by personal factors of each teacher - his or her knowledge, attitudes and beliefs, as well as their behaviors, filling out all three of Bandura's (1977a, 1986) reciprocally determining factors. If teachers believe that English Learners are capable of engaging in rigorous mathematics instruction, and they have the knowledge, resources, and tools to provide culturally and linguistically responsive strategies, the outcomes for English Learners look bright.

This study built upon the literature review to see how personal, behavioral, and environmental factors affect middle school math teachers' instructional delivery for English Learners in this small urban district and how they might be influenced to change outcomes for the better for English Learners.

# CHAPTER 3

## METHOD

In order to gain an understanding of how middle school math teachers perceive English Learners' abilities to participate in rigorous, grade-level math instruction in the age of Common Core Mathematics, and how they perceive their capacity as teachers to provide such instruction, this study used a mixed methods approach to gather data from all of the middle school math teachers ($N = 16$) from one school district in Southern California. Further, the study explored what teachers feel they need at the school and district level in order to support their successful implementation of the Common Core Mathematics Standards as culturally and linguistically responsive teachers.

This chapter provides an overview of the methodology of the study, including the processes used to collect both quantitative and qualitative data. Then, it provides a description of the approaches used to analyze the data, including descriptive statistics and thematic analysis. The chapter concludes with a discussion of limitations and delimitations of the study.

### Research Questions

To better understand how to support teachers in developing the necessary beliefs and skills for working effectively with English Learners, this study focused on the following research questions:

- What are middle school math teachers' beliefs about English Learners' abilities to participate in rigorous, grade-level math instruction aligned with Common Core Mathematics and their own capacity to provide such instruction?

- How do these beliefs about students' and their own capacities impact the instructional decisions they make?

- What school and district level supports do middle school math teachers identify as necessary for supporting their development as culturally and linguistically responsive teachers who successfully implement rigorous, grade-level math instruction aligned with the Common Core Mathematics Standards?

**Method**

**Context**

The study took place in a small, urban, public school district in Southern California. The district offers schooling from kindergarten through eighth grade and serves 84% low-income students and 36% English Learners. There are two middle schools in the district, serving approximately 2,000 students; both schools have similar student demographics, with a student population comprised of 72% Latino, 8% African American, 6% Asian, and 3% White students. Additionally, 85% of students come from low-income households, and 18% to 26% identify as English Learners. When initially fluent and reclassified fluent English speakers are included, over 50% of students in this district speak a language other than English in the home.

These two schools participated in a statewide collaborative focused on increasing access to and use of academic language for secondary students for three years beginning in the 2016-2017 school year. Additionally, these two schools placed a particular emphasis on changing middle school teachers' mindsets to see building academic discourse as the responsibility of all teachers, not just those who teach English Language Development. In the fall of 2017, district leaders administered an electronic survey of all middle school teachers regarding their level of

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comfort with and frequency of implementation of academic discourse strategies, and although all content area teachers demonstrated some discrepancies between confidence in incorporating academic discourse in their instruction and the actual frequency of implementation, the math department results showed the largest discrepancy between the two. Because of the huge shifts in the language demands and expectations of the Common Core State Standards in Math, the low achievement scores in comparison to other content areas, and the wide discrepancies between teacher beliefs and behaviors, math instruction became the focus of this study. The researcher for this dissertation is a district office level administrator that has participated in this work with middle school leaders since 2017.

**Participants**

Participants for the survey included all 16 middle school math teachers in the district, ranging in age from early 20s to early 40s and comprised of African-American, Hispanic, Asian, and Caucasian ethnicities. Interview participants were a subset (n = 5) of the teacher pool.

**Procedures**

This was a mixed-method sequential quantitative-qualitative (QUAN-qual) study (Creswell, 2009) that examined quantitative survey data to describe overall perceptions of teachers and followed with qualitative interview data to illuminate the descriptive statistics. Mixed methods research does not subscribe to a particular worldview but rather is pragmatic in nature, focused on solving a problem and thus is not restricted to either quantitative or qualitative methods, but rather is open to whatever methodology serves its purpose (Creswell, 2009). Using a combination of the two methods allowed for utilizing the strengths of qualitative and

quantitative methods as well as filling in the gaps of each to arrive at a deeper understanding of the research problem.
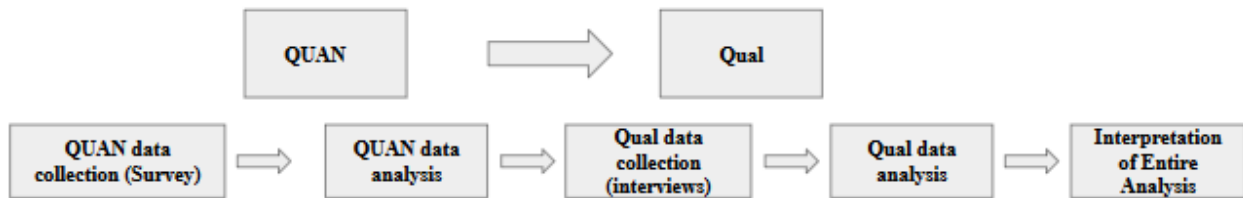


*Figure 1.* Sequential design. Adapted from *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* by J. W. Creswell, 2009, Thousand Oaks, CA: SAGE. Copyright 2009 by SAGE.

The study began with a survey of all the middle school math teachers in the district and then was followed by interviews with a smaller group of teachers. The sequential design was chosen to investigate how teacher beliefs about their English Learner students and about their capacity to effectively teach English Learners directly impact the instructional choices they make. The follow up qualitative interviews provided an opportunity to understand teachers' perceptions and what types of professional development they think they need to improve their practice.

**Gaining entry.** Prior to conducting the research study, I spent a year participating with the middle school math department in all department professional development sessions as a peer to develop and understanding of the work that they do, to offer the lens of how English Learners engage in learning, and to develop positive relationships with teachers. This provided access to the middle school math department when it was time to conduct the study.

**Recruitment**. In order to capture responses from all middle school math teachers in the district, I recruited survey participants through an existing professional development workshop.

As part of the workshop activities, I sent the survey to all sixth, seventh, and eighth grade teachers within the district ($N = 16$). For interviews, volunteers were first solicited as part of the survey followed by snowball and convenience sampling, with allowed me to recruit a total of five teachers representing each grade level and both school sites.

**Data Collection.** I collected data using a survey and interviews. See Table 3 for overview of what each method collected.

Table 3
*Survey and Interview Instruments*

|  | Survey | Interview |
| --- | --- | --- |
| Participants | All middle school math teachers ($N = 16$) | 5 teachers |
| Personal Factors* | Knowledge & Attitudes about Culturally and Linguistically Responsive Teaching (9) | Beliefs about teaching English Learners |
|  | Knowledge & Attitudes about High-Quality Mathematics Instruction (Views of Students' mathematical capabilities) (1) | Efficacy expectations |
| Behavioral Factors* (Culturally and Linguistically Responsive) | Efficacy Expectations (13) How teachers plan for and respond to English Learners' needs (4) | Instructional decisions made to support English Learners |
| Environmental Factors* | District and school level supports needed (1) | Context of shift to Common Core Math |
|  |  | Follow up on District and school supports identified in survey data |

*Note.* Adapted from * *Social Foundations of Thought and Action: A Social Cognitive Theory*, by A. Bandura, 1986, Englewood Cliffs, NJ: Prentice Hall. Copyright 1986 by Prentice Hall.

*Survey.* The electronic survey was designed to understand how math teachers and school leaders perceive personal factors such as English Learners' abilities to participate in rigorous,

grade-level math instruction in the age of Common Core Mathematics, and their feelings of self-efficacy in providing such instruction. The survey also measured environmental factors that include what they feel they need at the school and district level in order to support teacher development as culturally and linguistically responsive practitioners who successfully provide rigorous, grade-level math instruction in the age of Common Core Mathematics.

The survey was created based on a thorough review of the literature and was comprised of 28 questions. The survey items were adapted from previous surveys on teachers' beliefs about (a) English Learners and their abilities to participate in rigorous, grade-level math instruction in the age of Common Core Mathematics (Byrnes & Kiger, 1994; Gann et al., 2016; Polat & Mahalingappa, 2013; Reeves, 2006; Ritter et al., 2001; Spies et al., 2017; Tschannen-Moran et. al, 1998); (b) teacher beliefs about their own self-efficacy in teaching in general and in math (Enochs et al., 2000; Tschannen-Moran & Hoy, 2001; Tschannen-Moran & Hoy, 2007; Tschannen-Moran et al., 1998; Wilkerson et al., 2017); and (c) environmental factors impacting teacher practice (Byrnes & Kiger, 1994; Gann et al., 2016; Reeves, 2006; Tschannen-Moran et. al, 1998). The surveys utilized many different terms for English Learners (Dual Language Learners, English Language Learners, non- or limited English proficient students, ESL students, etc.) and thus were modified to "English Learners" for consistency. "ESL" was also a term not used in the school district where the study will be situated, so the term was modified to "ELD" or "English Language Development."

As Table 3 indicates, the survey questions adapted from previous surveys were organized according to the three elements of Bandura's (1986) Social Cognitive Theory—personal factors, behavioral factors, and environmental factors. Personal factors included knowledge and attitudes

about culturally and linguistically responsive teaching and views of students' mathematical capabilities.  Behavioral factors included how teachers plan for and respond to the needs of English learners, and environmental factors asked about district and school level supports needed.

Participants were asked to indicate their degree of agreement with statements using a 5-point Likert scale (ranging from 1, for "strongly disagree," to 5, for "strongly agree." The instrument also included an open-ended portion for participants to prioritize needs for comprehensive supports to improve their practice in meeting the needs of English Learners.

Three constructs from the literature were intentionally excluded from the survey instrument: mathematical knowledge for teaching (Cobb et al., 2018; Wilkerson et al., 2018), knowledge of culturally and linguistically responsive teaching practices (Gay, 2013; Harper & de Jong, 2004; Hollie, 2018; Karabenick & Noda, 2004; Ladson-Billings, 1995; Lucas et al., 2008; Paris & Alim, 2014; Villegas & Lucas, 2011), and language politics (Byrnes & Kiger, 1994). Mathematical knowledge for teaching was excluded because the emphasis of this study is not on what teachers know about math content, but rather how efficacious they believe they are in transmitting that knowledge, and their beliefs about English Learners' abilities to receive and apply that knowledge. Culturally and linguistically responsive teaching practices were also excluded from the survey so as not to seem like a test of teacher knowledge. The construct of language politics was also excluded because of the positionality of the researcher and the correlated potential desire of participants to give the "right" answer. These three constructs were addressed in the semi-structured interviews.

*Interviews.* Semi-structured interviews lasting approximately 30 minutes were conducted with five teachers. Three teachers were interviewed face-to-face on school grounds, one by telephone, and one through email. All oral interviews were transcribed afterwards. The goal of the interviews was to flesh out behavioral factors such as the impact of beliefs on the instructional choices teachers make, and like the survey questions, were also organized according to personal, behavioral, and environmental factors (Bandura, 1986). As Table 3 above demonstrates, interview questions regarding personal factors delved deeper into teachers' beliefs about teaching English Learners and their feelings of self-efficacy.  Behavioral factors examined instructional decisions made to support English Learners, and were designed to explore  teacher practices as productive or unproductive (Cobb et al., 2018; NCTM, 2014), and culturally and/or linguistically responsive (Gay, 2013; Harper & de Jong, 2004; Hollie, 2018; Ladson-Billings, 1995; Lucas et al., 2008; Villegas & Lucas, 2011; Paris & Alim, 2014). Interview questions regarding environmental factors were designed to flesh out the context in which teachers work, including the relatively recent shift to Common Core mathematics as well as the supports provided by the school and district. Questions targeting this support were developed from the research regarding the district and school supports necessary for comprehensive school reform (Cobb et al., 2018; Ruffalo, 2018). See Appendix B for the semi-structured interview design.

## Analysis

Each construct in both the survey and the semi-structured interview was adapted from surveys already validated in the literature. Due to the small sample size, the quantitative analysis focused on descriptive statistics, including frequencies, means, and standard deviations. Qualitative data were coded using codes derived from the conceptual framework as well as

emergent codes present in the data. In addition to interview transcripts, responses to open-ended items on the survey were included in the qualitative analysis.

Interview data and open-ended survey items were analyzed through the lens of the conceptual framework developed around Bandura's (1986) social cognitive theory as applied to working with English Learners, teacher self-efficacy, mathematics teachers' beliefs about high quality instruction and English Learners' capabilities in math, and the supports teachers need in order to teach English Learners effectively. Because this is a new conceptual framework that weaves together multiple theories, the coding of the constructs in the interview data was emergent.

Looking at the quantitative and qualitative data together helped clarify which students teachers identified as "English Learners", what challenges they identified as pertinent to all students regardless of language proficiency, and which students they struggled the most to teach.

## Limitations

A key limitation of this study is my position as a senior leader who oversees programs for English Learners in the school district where this study took place. This could have negatively affected the teachers participating in this study, who might have felt compelled to agree with my assumptions or give the politically correct "right answers" despite their true feelings. For this reason I excluded any questions from the construct in the literature concerning language politics (Byrnes & Kiger, 1994). I also consciously excluded the construct of mathematical knowledge for teaching, as the literature concludes that it is important, but not as important as teacher beliefs about students and their own self-efficacy (Cobb et al., 2018).

The participation of all middle school math teachers in the district of study is a strong indication that the results are representative of their beliefs and practices. Though these results may not be generalizable to all districts, they will definitely provide results that will be useful to improving supports and practice in the specific schools and district studied.

## Delimitations

This study could have involved middle school teachers across all content areas but was limited specifically to math for multiple reasons. First, math has been identified as the gatekeeper subject that most often hinders students' access to post-secondary education (Martin et al., 2010), and this is exemplified by the study district's California Assessment of Student Performance and Progress (CAASPP) math scores, which lag far behind their scores in English Language Arts. Second, math teachers as a profession still debate the importance of lecture versus dialogic pedagogies (Munter et al., 2015), which makes implementation of the Common Core Standards challenging enough for those who teach students who are proficient in English, and even more so for those who teach English Learners. And finally, math was selected due to the results of an earlier survey conducted in the district that demonstrated math teachers had the biggest gap between believing that academic discourse strategies are important for student learning and actually implementing them.

# CHAPTER 4

## FINDINGS

### Study Background

The purpose of this study was to examine teachers' beliefs about their English Learner students as well as their capacity to successfully teach them. This chapter presents findings drawn from the quantitative survey data as well as more illustrative information culled from qualitative interview data. In the sections that follow, I present themes related to the three research questions: (a) teacher's beliefs about their English Learner students, (b) their self-efficacy as teachers of such students, and (3) necessary supports for teachers to develop as culturally and linguistically responsive teachers.

Though the interviews were focused on teaching all English Learners, they surfaced many emotions and struggles that the participants face in the overall context of teaching math in the common core era, regardless of student background or language proficiency. When pushed to consider English Learners exclusively, their responses were limited to a small subset of the English Learner population—newcomers—and their degree of positivity was influenced by the type of newcomer the student was (well educated, grade level, or underschooled). The chapter delves into an analysis of this omission of the majority of English Learners on the middle school campus and teachers' varying views of the different types of newcomers and ends with a discussion of the additional findings related to the context of teaching math in the common core age.

## Teachers' Attitudes towards Teaching English Learners

Math teachers had much to say about the numerous challenges they face with *all* students, regardless of language proficiency, including the pressures of adapting to the shifts of the Common Core State Standards while feeling trapped in the high stakes game of standardized testing. Despite frustration and negative feelings related to the demands, challenges, and struggles involved, when pressed to consider English Learners separately, the majority of teachers demonstrated optimism and a welcoming stance towards adding English Learners to this high stress mix.

In examining the qualitative and quantitative data collected for this study, I identified three themes that speak to the question of teachers' attitudes toward English Learner students: (a) English learners can be successful; (b) English learners are welcome in the math classroom; and (c) English learners challenge teachers to diversify their pedagogical approaches. Again, these themes are influenced by which English Learner profile the teachers are visualizing, either consciously or unconsciously. I examine each of these themes in turn below.

### English Learners Can Be Successful

To learn how teachers perceive English Learners and their ability to participate in rigorous mathematics instruction, nine items were asked on the survey to measure each teacher's attitudes towards having English Learners in their classes and their abilities to learn mathematics. A Likert scale was used from 1 or "strongly disagree" to 5 or "strongly agree." The means and standard deviations for those items are reported in Table 4 below.

Table 4
*Means and Standard Deviations for Attitudes towards English Learners*

| | Mean | SD |
|---|---|---|
| The inclusion of English Learners in my classes increases my workload. | 3.69 | *1.20* |
| English Learners can be successful in learning mathematics if the teaching is effective. | 4.19 | *1.33* |
| For English Learners, learning the English language should take precedence over learning subject matter at school. | 2.88 | *1.15* |
| Having an English Learner in the classroom is detrimental to the learning of other students. | 1.94 | *1.00* |
| English Learners should not be included in general education classes until they attain a minimum level of English proficiency. | 2.00 | *1.21* |
| Content area teachers do not have enough time to deal with the needs of English Learners students. | 2.88 | *1.26* |
| Until students have learned to speak English, I shouldn't expect too much from them in my class. | 2.19 | *1.28* |
| Content area teachers are responsible for English Learners' language development. | 3.06 | *1.40* |
| English Language Development (ELD) teachers are responsible for English Learners' language development. | 3.50 | *1.32* |

*Note*: N = 16

The numbers above indicate the level of agreement amongst teachers regarding each statement. Teachers felt the strongest agreement with the statement "English Learners can be successful in learning mathematics if the teaching is effective" (*M* = 4.19, *SD* = 1.33). Of the 16 respondents to the survey, 13 responded "Strongly Agree" or "Agree" while 3 responded "Strongly Disagree" or "Disagree." Teachers demonstrated the strongest disagreement with the statement "English Learners should not be included in general education classes until they attain a minimum level of English proficiency" (*M* = 2.00, *SD* = 1.21). Of the survey respondents, 12 out of 16 responded "Strongly Disagree" or "Disagree" with this statement. Teachers' overwhelming agreement that English Learners can be successful if the teaching is effective and

disagreement with segregating English Learners until they reach proficiency demonstrates acknowledgement that (a) English Learners can be successful in all content areas and should have access to them; (b) teacher effectiveness is of primary consequence; and (c) all teachers' bear responsibility to support English Learner students. These findings align very closely with the tenets of linguistically responsive teaching discussed in Chapter 2.

Teachers expanded upon these ideas in their responses to the open-ended survey question that prompted them to list the benefits they perceive from including English Learners in their math classes. Overall, they noted the benefits enjoyed by all students when teachers view diversity as a strength and value different experiences with math, including learning multiple ways to solve mathematical problems based on students' prior learning in other countries.

In interviews, teachers affirmed their beliefs that English Learner students can be successful, but also revealed a narrow interpretation of the term "English Learner". Whereas the survey asked respondents to think about English Learners as a general group, in interviews the teachers tended to focus on newcomer students who speak no or very little English; long-term English learners (LTELs), or those who have been learning English for six or more years, were not mentioned at all. They also focused their positive remarks on the students who would be described as the highly-educated newcomers, who were described as "smart . . . able to figure stuff out, [and] . . . extremely resilient", arriving with "a high literacy background in their home language", and "tend[ing] to be more driven to learn the new language and accelerate faster in retaining English" than other English learners. Teachers' beliefs about the capacity for academic success for this subgroup of English Learners expressed in the interviews align with the literature on culturally and linguistically responsive teaching that emphasizes the importance of teachers

holding high expectations for all students while being sensitive to students' individual needs (Cobb et al., 2018; Gay, 2010; TNTP, 2018; Werneck De Almeida, 1999).

**English Learners Are Welcome in the Math Classroom**

As demonstrated in Table 3 above, teachers showed the strongest disagreement with the statements "Having an English Learner in the classroom is detrimental to the learning of other students" and "English Learners should not be included in general education classes until they attain a minimum level of English proficiency." The mean response to the statement "Having an English Learner in the classroom is detrimental to the learning of other students" was 1.94 (*SD* = 1.00), indicating disagreement by the majority of teachers. Of the 16 respondents to the survey, 11 responded "Strongly Disagree Agree" or "Disagree" while 1 responded "Strongly Agree" or "Agree." It is worth noting that 4 teachers neither agreed nor disagreed, raising the question of what it means that one quarter of the teachers in this study were neutral with this statement. Interviews shed some light on the welcoming stance expressed by most teachers, as participants shared their efforts to ensure that these students feel safe and included. Teachers described how they develop personal connections with students by getting to know the whole student, using students' primary language (mainly Spanish), noticing when students are absent, and creating safe learning environments.

Getting to know the whole student was identified as critical in getting students to at least attempt to learn math. This included getting to know their stories and building relationships so that they "feel comfortable being in here and being vulnerable enough to raise their hand and ask questions". Utilizing students' primary language was also noted, even for those not fluent in that

language, as "sometimes struggling in my Spanish helps the other students . . . feel more comfortable speaking to me in English."

Another way to connect with students was the simple act of noticing when they are absent. One teacher shared how they balanced the stress of performance on the annual state standardized test with their concern for the well-being of their students:

I found it very . . . surprising with the survey we gave the . . . whole school recently about how do you . . . feel connected here? And some of the questions are like "my teacher notices when I'm absent," and . . . that's huge with me. I drill the student big time when they come back like where were you? what's going on? I need you here. I'm very passionate about that. I'm very selfish, too. I want them here so I can get my score up. I want them here so they can learn it. I'm not gonna lie. It is about my score. I want my score to be good. And I think . . . in turn, it helps them, because they see how serious I am so hopefully they . . . get . . . serious.

A final culturally and linguistically responsive teacher move identified was creating safe learning environments. Strategies identified included giving compliments, setting a tone of zero tolerance for teasing, and celebrating wins.

One of my strategies day one is like we're not going to attack each other in here. If a struggling student can turn around, we're going to give it up, clap for them and be proud of them, because that's the way I expect it to be. I always compliment them when they do awesome. I always do that for any student, but especially if they're EL . . . one thing I cannot stand in a mainly Hispanic district here . . . is when the students tease an EL student. I hate that. Because, just the fact that you're trying to learn English is props in

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my book and . . . the fact [that] they don't see that or they gotta call them out on that - that

gets me to no end. And so whenever I hear that, I call that out immediately and shut that

down because I cannot stand that.

Overall, teacher responses demonstrated that English Learners are welcome in their classes, and

that they put tremendous thought and effort into making them feel safe and capable.

**English Learners Challenge Teachers to Diversify Their Pedagogy**

This tremendous thought and effort expended does come at a cost for teachers, as

indicated by their responses to the survey question "The inclusion of English Learners in my

classes increases my workload" ($M$ = 3.69, $SD$ = 1.20). Of the survey respondents, 12 responded

"Strongly Agree" or "Agree" with this statement. The shift to the common core had already

pushed math teachers to become language teachers, as students had to "learn strategies for

reading and understanding math problems, discussing with others, listening to and clarifying,

refining, justifying, or challenging the arguments of others, and for communicating their thinking

in writing". These shifts had already increased teachers' workloads as they described adding

daily reflection, searching for multiple ways to explain or give examples on how to simplify or

solve equations, and figuring out how to scaffold to ensure student access to content "because

math is its own language."

As teachers listed the challenges for their newcomer students, there seemed to be a shift

to discussing a different profile of newcomer—the under schooled newcomer. In addition to

what all students need to be successful in mathematics, teachers identified particular challenges

for this subset of English Learners:

Many of our EL students . . . are first generation in the US . . . and even in their home

language I notice they have very little mastery. Communication between parents and

students can be very basic and limited in vocabulary. Students face the challenge of

learning their home language, standard English, academic language, and specific

language in mathematics.

Teachers also highlighted learning to "speak math" as particularly challenging for newcomers, in part because eccentricities in word use and meaning prevent English Learners from even accessing what the problem is asking them to solve. An example of this shared by one teacher was the word "steps," which, as they described could mean

. . . physical steps, it could be steps to how to do a problem . . . [or] could

be talking about change—there's so many different ways that you could

use that word that just having the newcomers understand what that's like

when we're talking about math, this is what we're talking about.

In addition to these vocabulary challenges, teachers also identified reading and

understanding word problems as particularly difficult for English Learners due to low reading

comprehension, often in both their home language and in English; not understanding specific

language in math around procedures; trying to parse academic language that "does not always

translate or take on the same meaning from their everyday, common language to the content

specific definition"; and contexts and real world examples that are disconnected from the

experiences of [their] students." These challenges create what one teacher termed as "students'

loathing for word problems."

With all of these challenges facing their students, it is not surprising that teachers' daily

reflections, identification of multiple solution paths, and creation of scaffolding to ensure English

Learners can access the vocabulary and procedural language necessary for success adds to their workloads, as these strategies are time consuming and require patience, perseverance, and endurance to maintain on a daily basis.

**Summary**

Overall, middle school math teachers' attitudes towards having English Learners in their classes were positive, especially towards highly educated newcomer students. Teachers saw these English Learners as bringing new ideas into the classroom and reminding teachers of the language and vocabulary that all students need in order to be successful in math. Most teachers indicated that any skill gaps that English Learners had could be overcome by good teaching, though they were clearly concerned about the deficits brought by under schooled newcomers and the impact they had on their workload.

### Teachers' Feelings of Self-Efficacy in Teaching Mathematics to English Learners

Teachers' concerns about their increased workload are closely related to their feelings regarding their own capacity to provide rigorous, grade-level math instruction aligned with Common Core Mathematics to English Learners. In examining the qualitative and quantitative data collected for this study, I identified two themes that speak to the question of teachers' feelings of self-efficacy: (a) overall, teachers are confident in their abilities to teach math in general, but (b) they struggle with the most unmotivated or difficult students. I examine each of these themes in turn below.

**Teachers Are Confident in Teaching Math Overall**

To learn how teachers perceive their ability to provide rigorous mathematics instruction, 13 items were asked on the survey to measure each teacher's beliefs about their own capacity to

teach mathematics effectively, particularly to English Learners. Data from those items are listed

below in Table 5.

Table 5
*Means and Standard Deviations for Teacher Self-Efficacy*

|  | Mean | SD |
|---|---|---|
| When a student gets a better grade than he/she usually gets, it is usually because I found better ways of teaching that student. | 3.31 | 0.95 |
| If a student did not remember information I gave in a previous lesson, I would know how to increase his/her retention in the next lesson. | 3.25 | 0.93 |
| If I try really hard, I can get through to even the most difficult or unmotivated students. | 2.88 | 1.26 |
| I am able to effectively teach math to children whose first language is not English. | 3.50 | 0.97 |
| I am able to teach math to children who speak English as a second language as effectively as I am able to teach math to children who speak English as their first language. | 3.44 | 1.26 |
| I am able to effectively monitor the math understanding of children who are English Learners. | 3.31 | 1.25 |
| I continually search for better ways to teach mathematics. | 4.40 | 0.74 |
| I know how to teach mathematics concepts effectively. | 4.19 | 0.83 |
| The inadequacy of a student's mathematics background can be overcome by good teaching. | 3.13 | 1.36 |
| I find it difficult to use manipulatives to explain to students why mathematics works. | 2.88 | 1.03 |
| When a student is having difficulty with an assignment, I often have trouble providing a starting point without lowering the rigor of the standard. | 2.56 | 0.89 |
| I am typically able to answer students' questions. | 4.60 | 2.80 |
| When a student has difficulty understanding a mathematics concept, I will usually be at a loss as to how to help the student understand it better. | 2.00 | 1.16 |

*Note*: $N = 16$.

The numbers above indicate the level of agreement amongst teachers regarding each

statement. Teachers felt the strongest agreement with the statement "I am typically able to

answer students' questions" ($M = 4.60$, $SD = 2.8$) and "I continually search for better ways to

teach mathematics" ($M = 4.40$, $SD = .04$). Teachers showed the strongest disagreement with the

statements "When a student has difficulty understanding a mathematics concept, I will usually be

at a loss as to how to help the student understand it better" ($M = 2.0$, $SD = 1.15$), and "When a

student is having difficulty with an assignment, I often have trouble providing a starting point without lowering the rigor of the standard" ($M = 2.56$, $SD = .89$). These responses demonstrated that overall, teachers felt confident that they could support students in math instruction.

**Teachers Are Challenged by the Most Difficult Students**

Despite this optimism, however, teachers showed varied opinions regarding the statement "If I try really hard, I can get through to even the most difficult or unmotivated students" ($M = 2.88$, $SD = 1.26$). Of the 16 respondents to the survey, seven responded "Strongly Disagree" or "Disagree," four teachers neither agreed nor disagreed, and five responded "Strongly Agree" or "Agree." Teachers were also nearly evenly split over the statement "The inadequacy of a student's mathematics background can be overcome by good teaching" ($M = 3.13$, $SD = 1.36$), where six teachers responded "Strongly Disagree" or "Disagree" and 7 responded "Strongly Agree" or "Agree," with three choosing the neutral response. This lack of confidence appears in working with any challenging students, regardless of their language ability. Interview results illustrated that the changes in the rigor and language demands brought by the Common Core have increased challenges associated with motivating students to learn, particularly struggling learners with large skill gaps. One teacher described what that skill gap can look like in eighth grade, with students who do not yet know how to multiply efficiently:

> They're multiplying six times eight, by adding the number six eight times upon itself. And so you can just see the problems with that, you know, the time constraint, the calculation errors you're going to make in that wonderful strategy because it's true, multiplication is repeated addition, but by this point in their math career, those are some fundamental things that should not be occupying so much of their hard drive space.

Sixth grade teachers also expressed concern about the high percentage of students entering with below proficient SBAC scores in math, stating that "67% of . . . kids [in our school] need tutoring . . . [and] I can't give it extra time during the school day. It like . . . it's really sad almost, the state of support that . . . we just don't know what works."

An interesting finding regarding these skill gaps is that the teachers interviewed did not blame students for them. The culprits identified were either lack of schooling (high absence rate or interrupted schooling, most notably amongst under schooled newcomer English Learners) or inconsistent prior teaching due to differing "postures towards math" amongst teachers. This inconsistency in prior teaching was described as:

> Some [teachers] in our school district . . . don't have the content knowledge, and then they rely heavily on tricks [to solve equations] . . . And so if teachers didn't teach tricks and instead relied upon students' sense making skills and strategies, boy that would make for a lot more understanding in our students. And I know that there's some teachers who just have to rely on those tricks because that's how they learned it. But it's one of those overarching problems, or . . . certain teachers' posture towards math, [that] math is, is about algorithms, it's about getting an answer as opposed to problem solving, and sense making.

English Learners with limited or interrupted schooling further compound the skill gaps, and trying to fill these skill gaps as well as communicate with students who don't speak English, while also trying to meet the needs of their fluent English students causes frustration for teachers, making "[their] classes move more slowly and [their] EO [English Only] students feel like they

are not getting the same experience [their] other classes do" and making them feel less effective as educators.

**Impact of Skill Gaps on Students**

Regardless of the reasons for the existing skill gaps, students are the ones who pay the price for them. These gaps in understanding are not invisible to students, and this has led to student behaviors belying an identity of being an "intentional non-learner." Intentional non-learners were described as:

> students who just check out . . . they refuse to work . . . I mean, they don't want to engage in any of the discussions or activities. And so I'm seeing an increasing number in that student population, just students who don't think they have much of a hope or future in math.

This group of "intentional non-learners" has many characteristics that are found in the profiles of both under schooled newcomers and Long-Term English Learners, both of which struggle with social-emotional issues around self-esteem, self-efficacy, and comprehension of what it takes to be successful academically. Teachers noted that newcomer students experience social-emotional/behavioral issues related to moving to a new country, a desire to avoid negative attention from peers and teachers, and the stress of learning new cultural norms. As with the academic challenges identified above, teachers identified language challenges as a contributor to social-emotional issues. As one teacher described:

> . . . it can become frustrating because students that don't understand the language, and also don't understand the English, don't understand the language of math, and sometimes

don't even, can't even read their own language. They can become disruptive because they

just don't understand.

This is frustrating for both the student and the teacher, as the student may shut down or turn

disruptive to avoid challenging work, and the teacher may become exasperated looking for a way

to provide access for the student. Teachers also noted that newcomers are often very reluctant to

share or willingly participate in class discussions, and often try to avoid having attention placed

on them. They felt that they have hesitation to work, possibly caused by questions that have

regarding the language of the lesson or the skill being taught. Other hypotheses were anger

regarding being moved to the US, living with relatives that they don't like, and the stress of

learning the cultural norms of a new country, and "not understanding the ramifications of what

you can and can't say to a teacher."

**Impact of Skill Gaps on Teachers**

This stress caused by the challenges in meeting the needs of so many diverse learners in

the high stakes testing environment of schools today has also taken a large toll on teachers'

professional and personal lives. One teacher described the pressure felt at work as:

There's always been newcomers, there's always been English learners. I would say that

there is greater pressure now to help the English learners than there used to be, because

we didn't have an ELD [English Language Development] program in the past . . .  and

that there's a pressure now, a double pressure to help them have the English proficiency

and math proficiency.

The pressure to meet all students' unique needs had such a negative impact on teachers

that some have considered leaving middle school math and moving to the elementary level,

sharing "feeling so defeated all the time" due to the demands placed on them when teaching classes with a large number of English learners, and feeling frustrated with "[students] that just sit and do nothing."

Despite the stress induced by these feelings of a lack of efficacy, one teacher's reflection led to a change in mindset:

> Every night when I go home or when I'm packing up I always think about how my day went and if there's things that I need to change for tomorrow or things that maybe I missed. Sometimes I go home and I just feel like it was a wash. And it can be very discouraging. So, I know last year was a pretty rough year and this year. . . . I've had to change my attitude and just be more about what students need and not more about what I need to feel successful so if I see that maybe they're feeling successful that's more important, from my standpoint now, than me having to push, push, push.

**Summary**

Math teachers in this study felt that overall they were quite capable in teaching mathematics to students who are motivated and who do not have large skills gaps. When approaching students such as under schooled newcomers and LTELs, who often enter their classrooms with large skills gaps and commensurate social-emotional issues, their feelings of self-efficacy were much lower, and they expressed deep feelings of frustration.

<center>**Instructional Decisions Made**</center>

The literature described how teachers' beliefs about their students' capabilities as well as their own self-efficacy as teachers determined the instructional decisions they make. Questions about these decisions were limited to the interview portion of the study so as to enable

participants to elaborate. For the teachers in this study, those beliefs about students and their own self-efficacy led them to adopt instructional practices that exemplify culturally and linguistically responsive teaching practices. These practices included the following supports: (a) developing personal connections via relationships between the teacher and student and between students as described in the section above on creating a welcoming environment; (b) utilizing group work, and (c) intentional design of lessons for access and successful participation.

**Utilizing Group Work as an Instructional Strategy**

The instructional practices identified by teachers varied from no differentiation at all for English Learners, as exemplified by the comment "I don't really adjust my curriculum at all. I just teach math," to a common strategy of some form of partner or group work and explanations, with varying degrees of success:

> One regular thing we do is turn and talk. And by talking, I really hope that the students are talking on task or about . . . the question itself. And then after we do the turn and talk, and we have share in a group, so, tables are in fours or sixes. So after they talk in dyads, so and open up to the group, and then I'll open it up, the floor that is, to the entire classroom and see if there's anyone who can share out so there's multiple times that a student will have a chance to revise your thinking, to ask their questions, for them to approximate an answer to even formulate an opinion. And so I use a lot of that talking or discussion strategy for all learners to demonstrate understanding and to build that understanding.

A benefit of this strategy was identified by one teacher in how it helped newcomers with developing language:

I have them do a lot of group work and group explanations.  A lot of the times they argue

which is good, because I think they're learning how to utilize language, because

sometimes they say one thing, when they mean something else, and then somebody will

explain it differently, and they're like no, no that's what I said. And then when they

realize what they said was something different as their group may, I think that's when,

when they're learning how to use . . . the math language . . . more properly.

Because teachers relied on partner and group discussion so heavily, they have had to find

creative ways to engage students who cannot yet communicate in the target language of English,

which has led to a reliance on higher functioning students that they employ to serve as translators

and tutors. The pitfalls of this strategy include fatigue and frustration expressed by the student

tutors who

at first are really willing to help but it gets difficult for them to not just attend to their

own work, but also help the student next to them . . . [who] may or may not be motivated

as much as they are, and put in equal work.

**Intentional Lesson Design**

Partner work, at various levels of implementation and success, was the only instructional

strategy identified by the majority of teachers interviewed. One teacher did share specific pre-

planning of activities used to ensure more targeted participation and learning by English

Learners during these group tasks:

In my early teaching years, I struggled with incorporating more opportunities to engage

and scaffold for ELs. With the help of an [English Learner coach], we restructured a

lesson to provide access points for my ELs to participate. This participation could be

demonstrated in a variety of ways other than the traditional share aloud. We put together sentence frames, developed questions that could be answered with verbal cues, and opportunities for students to demonstrate via manipulatives and models. [Now] I structure my lessons to reintroduce old concepts, and review language around content from previous grade levels. Before I can present new content, I must evaluate what prior knowledge students have. At times students do not have the foundational skills. When the lesson is centered around math vocabulary, I will present the words we will be learning alongside graphics showing examples and nonexamples of its use and then ask students to formulate their own definition. Students then get to pair share their findings before we share as a whole group. Other times I might ask students to come up with common words they are familiar with that sound alike, and then discuss the meanings of those words and how it might be related to the math content.

This teacher has also harnessed technology to further increase access and engagement for English Learners:

> In the past two years, as I have moved towards a 1-to-1 classroom I have more success in students actively participating and seeing an increase in engagement. Using apps such as Pear Deck, I can design my lessons to include more visuals and even link students to online manipulatives so that there is variation in how students can participate. The more opportunities students can have to demonstrate their understanding will eventually elicit their participation and motivation to learn.

**Summary**

Teachers utilized numerous culturally and linguistically responsive strategies to support their English Learners, relying most heavily on social-emotional supports such as creating safe and welcoming learning environments through getting to know their students, demonstrating concern for their well-being, and celebrating successes. Academic supports were identified less frequently, with four of the five teachers interviewed identifying group work as a strategy to incorporate academic discourse, but only one teacher identified pre-planning of specific linguistically relevant strategies to ensure success for English Learners in these group activities.

**Supports Needed by Teachers**

All five teachers interviewed had positive things to say about the supports they have already received, from an administration that is "willing to listen and not blame, but try to help", to support by ELIRTs and (previous) math TOSAs, instructional aides, and technology. They also expressed frustration with structural constraints that still need to be addressed, such as "support in terms of really understanding the magnitude of the problem, just the sheer numbers in terms of how much extra help the kids will need, if they're going to get to proficiency". The magnitude of the problem includes the numerous challenges they face with *all* students, regardless of language proficiency - the pressure of adapting to the shifts of the Common Core State Standards while feeling trapped in the high stakes game of standardized testing. This stress is then compounded by the need to make up for large gaps in students' conceptual understanding and skills and battle the student apathy caused not only by a history of prior math failure, but also society's acceptance of mathematical incompetence.

**The Shift to the Common Core State Standards**

Though for the most part acknowledging agreement with the shifts required by the Common Core standards, teachers described finding it challenging for a variety of reasons, including the increased rigor, the time needed to teach all the standards, a lack of clarity around "knowing what [standards] we can take off the plate", and the challenges of the language demands for communicating reasoning, which are asking teachers to teach in a way that is completely different from how they were taught. This disequilibrium was described by one teacher as:

> In my past experience, as a student, learning seemed to be driven by rote memorization of processes and procedures. Since I have started teaching, there has been more of a focus on academic discourse. The expectation is not only that students can apply concepts and procedures, but also communicate and defend their reasoning. There also seems to be more of a demand for students to work in a collaborative environment with peers.

> This difficulty with the language, or "thinking mathematically," was highlighted as a struggle for all students, even those who are fluent English proficient. Most teachers interviewed suggested that math is " . . . kind of an even playing field because it's a new language for everybody . . .[it] puts everybody [as] kind of an EL in the sense of students that don't know how to speak 'math'." The challenges of developing mathematical thinking in the era of Common Core were also described as "practices [that] place a great deal of demand for academic language and communication skills . . .  [and] if students do not have command of the language demands, students will struggle in their ability to be effective communicators of their ideas."

This variety of learning styles and abilities can feel overwhelming to teachers, especially since the gaps in conceptual understanding and skills in mathematics can be huge by the time students reach middle school. Teachers attributed students' large gaps in conceptual understanding and corresponding hopelessness regarding math to (a) societal norms that condone a lack of math proficiency, (b) a lack of perseverance with problem solving due to technology's instant gratification, and (c) students' collective sense of helplessness.

**The Stress and Toll of High Stakes Testing**

All of the aforementioned stressors took place in the world of high stakes testing. Every teacher interviewed expressed feeling stress in trying to tend to skill gaps and language needs for all students while keeping pace with all of the content that needs to be covered before the state test in the spring. One teacher described the angst they feel when making decisions between what teachers know as best practice for teaching mathematics and what their time constraints permit in this way:

> Within mathematics, there is a wide variation of concepts and skills to cover and for students to master. The challenge I currently face is to keep up with the pacing guide and presenting all content before SBAC. Providing opportunities for student-discourse always yields positive results in terms of enriching student understanding, but this also takes time to incorporate into instructional minutes. At moments, making the time to have these academic discussions seems like a sacrifice of other content down the line.

This pressure can also influence teachers' decisions regarding in which students to invest time and effort. One teacher expressed the difficult choices made as the state test gets closer:

Once you [the student] start not caring, especially in the middle or getting to the end of

Tri[mester]2, I'm focusing on the ones that want to graduate and work. I'll still tell you to

get to work once in a while. I can't waste my energy and I gotta help the ones that are

borderline passing the SBAC and who are happy to achieve. It sounds mean as a teacher,

but aside from holding the pencil for them, what else can I do?

These pressures definitely influenced the type of supports teachers identified as necessary from

their school and/or district to help them improve their ability to effectively teach English

Learners on the survey. Teachers identified supports such as "ways to extend instructional time

for students if we expect them to move toward proficiency," such as an extra period for math

($N = 2$). Teachers also asked for more support from the administration, which included (a) their

understanding of just how big a task it is to move students to math and English proficiency at the

same time, (b) a method of bridging the gap between fifth and sixth grade, and (c) smaller class

sizes ($N = 2$). The supports identified most frequently were regarding more in-class support ($N =$

6). and more time to plan, practice, and collaborate with colleagues ($N = 6$).

The responses from the open-ended question on the survey were shared with interview

participants for elaboration. More in-class support was mainly defined as a bilingual aide or

translator who could provide small group instruction, clarify questions, support newcomers,

and/or rewrite instructions in Spanish. This need was further clarified in the interviews by both

Spanish and non-Spanish speaking teachers.  Four of the five teachers interviewed did not speak

Spanish, and relied heavily on their bilingual aides for support.  One teacher described his

gratitude for this support in this way:

I think four days out of five over the week I get translators. Without that, I don't

know what I'd do. I'd have to, I would have to pair them up with non-shy, good

students, and I don't think I have enough. I don't think there's enough eighth graders

out there to fit that role to where they can sit there and help, and not be reminded to

and all that. To have these tutors here that's just awesome. If I didn't have help with

EL students, they would just be sitting there waiting for me to come back to help

them or . . . or [I would be] telling the "regular" student, you know, help them.

Even a bilingual teacher who spoke the same language as the newcomers in his class described

the benefits on a bilingual instructional assistant this way:

Although most of my ELs speak Spanish, and so do I, it is difficult for me to carve out

the time to work directly with ELs. When possible I check in with them, try to translate

to the best of my ability and have conversations with them in Spanish, but that time is

scarce as I am giving instruction bell-to-bell. Having an aide to provide small group

instruction has been beneficial in the past. Students seem more comfortable and confident

to ask questions and share with peers of similar ability when split into small groups. As

of this year, ELs in math are not getting that support, so in speaking to other math

teachers it seems like the ELs are left lost and having trouble accessing the content as it

builds.

While acknowledging the need for language support with instructional aides, two

teachers also identified a need for adequate training for instructional aides so that they could

function not only as translators, but also as instructional support providers. This, they

acknowledged, would also require time for training and planning alongside the teacher(s) they

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support, which would be challenging to provide, not only due to scheduling issues, but to teachers' differing ideas about how an aide should be utilized in class.

The other most frequently mentioned support teachers would like was more time to plan, practice, and collaborate with colleagues. This included having more information and strategies from the ELIRT on how to best serve the needs of the English Learners (e.g. sentence starters/sentence frames, academic vocabulary words, etc.), strategies and supports from a math coach, and professional development sessions focused on practicing those strategies. Teachers expressed gratitude for opportunities to attend conferences, but also disappointment at the lack of follow through afterwards, as "strategies are always being suggested and given to us in PDs [professional development sessions], but never ways nor time to implement what we have learned." And even though expressing a desire for more collaborative planning time, teachers admitted conflicting emotions around time constraints imposed by such commitments as "trying to give feedback to the students with the grading that I'm doing, planning with my other eighth grade counterparts, and trying to teach or trying to incorporate all the lessons for SBAC". Another fear identified was trying to collaboratively plan with teachers with "different philosophies" with whom "I don't know if we'll have any common ground".

**Summary**

Teachers felt that the most impactful supports that would enable them to successfully support English Learners as linguistically and culturally responsive teachers were bilingual instructional aides in the classroom, and time to collaborate, plan, and practice with colleagues. Both of these supports caused a bit of a conundrum; however, as they would require extra hours

outside of the school day or during common prep periods to accomplish, which then raised teachers' stress around feelings of not having enough time.

**Conclusion**

Middle school math teachers today work in a high-stress environment due to the instructional shifts required by the Common Core State Standards, the diverse language and learning needs of their students, and the public judgement of their effectiveness as rendered annually by standardized testing results. Despite these challenges, teachers in this study demonstrated positive attitudes towards English Learners and their abilities to participate in rigorous math instruction. They were less confident about their own capacity to meet the needs of the English Learners in their classes, particularly newcomers, who enter with limited language and often limited or interrupted schooling. Though they had many strategies for addressing the social-emotional needs of English Learners, they identified far fewer for preparing them to be able to participate successfully in academic discussions. To remedy this situation, teachers identified a need for more in-class supports such as instructional aides and more time to collaborate and plan with colleagues. Chapter 5 will now examine these results against the findings in the literature and make recommendations for future research and practice.

**CHAPTER 5**

**DISCUSSION**

In the previous chapter, I presented quantitative and qualitative data that evidence the challenges and successes middle school math teachers face in teaching English learners. Some of the themes were that teachers in this study have positive dispositions towards English Learners and employ numerous culturally responsive strategies such as getting to know the whole student, using students' primary language as support, and creating safe spaces for learning. In the area of linguistic responsiveness, however, teachers had far fewer strategies in their repertoire, but were interested in more time to collaboratively plan and practice new learnings in this area with their colleagues.

In this chapter, I discuss the key findings of the study in light of existing literature and the conceptual framework guiding the study. Then, I present recommendations for research and practice.

**Discussion of Findings**

**Dissonance between Teachers' Explicit and Implicit Beliefs**

The positive attitudes toward English Learners and their abilities to participate in rigorous math instruction demonstrated by teachers in this study stand in sharp contrast to what some previously-published studies have shown regarding secondary teachers' common misconception that students must be proficient in English before being able to participate successfully in content-area classes. This misperception, according to the literature, often leads teachers to hold lower expectations for English learners than for other students (Harrison & Lakin, 2018; National Academies of Sciences, Engineering, and Medicine, 2018; Ruffalo, 2018). As this study

showed, not all teachers believed in the need for English proficiency prior to engaging with other academic subjects. Teachers in this study made efforts to ensure access for all students to course content in subjects such as science and mathematics.

Although most teachers in this study expressed generally positive beliefs toward English learners, including their abilities to participate in rigorous math classes, there was a gap between beliefs and actions. On the survey, 75% of teachers agreed or strongly agreed with the statement that ELs increased their workload. Subsequently, in interviews, few teachers discussed employing culturally and linguistically relevant teaching beyond surface level. This is consistent with the negative orientation towards ELs as being more burdensome than fluent students (Flores & Smith, 2009) and with other studies regarding teachers' beliefs about ELs that identified both positive and negative beliefs, which "could explain the dichotomy between stated positive, welcoming attitudes and little direct action in terms of effective pedagogical choices on behalf of ELs in mainstream classes" (Harrison & Lakin, 2018, p. 97). Harrison and Lakin (2018) found that negative beliefs were "connected with misconceptions about second language acquisition and pedagogy", and this might explain why only one teacher interviewed discussed employing culturally *and* linguistically relevant teaching beyond surface level "turn and talk" and group work. The implementation of these strategies was attributed to ongoing collaboration with and coaching by the English Learner coach, and the lack of such collaboration might explain why the other teachers mentioned great frustration in "not knowing what works."

Teachers' feelings of self-efficacy also demonstrated a dissonance between their explicitly stated beliefs about welcoming English Learners to their classes and their implicit beliefs demonstrated by their behavior. Teachers demonstrated productive views (Cobb et al.,

2018), attributing student difficulty to instructional and/or school opportunities, as demonstrated by 81% responding "Strongly Agree" or "Agree" to the statement "English Learners can be successful in learning mathematics if the teaching is effective". Despite these productive views, however, they did not demonstrate fully productive *responses* to struggling students by implementing careful planning for the introduction of cognitively challenging tasks to ensure that all students could participate. Teachers were not confident about their capacity to meet the needs of the most difficult students, particularly newcomers, who enter with limited language and often limited or interrupted schooling. Though they had many culturally responsive strategies for addressing the social-emotional needs of these students (creating safe spaces for learning, getting to know the whole child), they identified far fewer linguistically responsive strategies for preparing them to be able to participate successfully in rigorous academic work.

The challenges teachers faced and the resultant frustration they felt fits with Bandura's (1986) social cognitive theory, which posits that personal (internal) factors, behavior, and environmental factors have reciprocal influences on each other in human functioning. Personal factors such as teachers' beliefs about their students' capabilities and their own self-efficacy influences their behavior as teachers, which has an impact on the learning environment. In this situation, teachers believe that EL students are capable, but do not believe they are able to influence students' outcomes and don't perceive their relationships with these students as positive and collaborative, which leads to lower feelings of responsibility for student outcomes (Matteucci et al., 2017). This was illustrated by the comment by one teacher that his focus had to shift to the "[students] who are willing to work."

This lowered sense of responsibility can be hypothesized to be caused by a mismatch in performance accomplishments (Bandura, 1977b), which are defined as expected outcomes and what actually transpired, how long teachers persevered, and what types of professional development and/or support was provided by the school. According to Bandura (1977b), performance accomplishments exhibit the strongest influence on self-efficacy by raising mastery expectations with successes and lowering them with repeated failures. Teachers who repeatedly fail at motivating the most difficult students thus eventually stop trying. This is particularly damaging if this influence spreads from teacher to teacher, as the culture of the school, or in the case of secondary schools, the department, has a greater impact on teachers' views than any other aspect of the school (Jackson et al., 2017).

**Invisibility of Long-Term English Learners**

Although teachers demonstrated positive attitudes toward English Learners and their ability to participate in rigorous math instruction, teachers' understanding of the heterogeneity of English learners was limited. Teachers focused on newcomer students, or those who have only recently entered the United States, and did not appear to recognize different instructional needs of Long-Term English learners. Rather they seemed to group them together with *all* students that they believe are limited in their ability to "speak math." Teachers did identify one group of particularly challenging students, termed by one teacher as "intentional non-learners," who they described as "students who just check out . . . they refuse to work . . . students who don't think they have much of a hope or future in math." This group would not be limited to Long-Term-English Learners, but the description certainly fits the profile of a student who has struggled for six or more years to reach English proficiency.

According to the research on LTELs, what makes the LTELs invisible to their content area teachers is the fact that their proficiency with social English masks underlying "gaps in basic English syntax, grammar and vocabulary," which causes them to struggle with "reading textbooks, making sense of specialized words, and handling long written passages" such as word problems in math (Olsen, 2010, p. 23). LTELs also demonstrate a misconception about the behaviors associated with academic success and engagement. Many believe they are behaving and performing as they should, having been passed from grade to grade despite their lack of understanding of academic content. Over time, however, some LTELs get discouraged, believe they are not capable, and act like the "intentional non-learners" one teacher described. Olsen (2010) found in interviews with students that this discouragement begins around fifth grade, so it makes sense that middle school math teachers would encounter them. It is important to support teachers in remedying these blind spots around LTELs because teachers' beliefs have been shown to be the most powerful influence on what instructional choices are made (Cobb et al., 2018; Gay, 2010; Jackson et al., 2017**;** Karabenick & Noda, 2004; McLaughlin & Talbert, 1993; TNTP, 2018; Werneck De Almeida, 1999). If teachers believe that LTEL students simply do not want to learn, and do not see or understand the underlying causes of their discouraged or "checked out" behavior, they will not make instructional decisions that will enable these students to engage in learning math. These attitudes also influence teachers' receptivity to professional development efforts to improve instructional delivery for LTELs and "to dispel unwarranted beliefs about language and cognition that, left unchallenged, can impede attempting new instructional practices that are more conducive to English Learner student success" (Karabenick & Noda, 2004, p. 56).

**Need for Increased School and District Support**

       The school and district in this study did not yet provide a comprehensive professional learning system to support teachers in developing the necessary skills and beliefs for teaching English Learners successfully. Cobb et al. (2018) found that a coherent instructional program is critical for a healthy school culture, and is comprised of (a) goals for student learning and a vision of high-quality instruction, (b) an integrated system of supports for teachers that includes pull out professional development, coaching, collaborative meetings, and teacher advice networks, (c) instructional materials and assessments, and (d) supports for struggling students. Teachers in this study identified a need for more in-class supports such as instructional aides to support their newcomer students and more time to collaborate and plan with colleagues to meet the needs of English Learners in their classes, especially after learning new content in professional development sessions. This was exemplified by two teachers' comments about the high value of the summer professional development they received, and their excitement about trying new strategies at the time, but how the time lag and the lack of follow through at their site once school started killed all their momentum. This predicament highlights the need for a fully fleshed-out professional learning plan that includes not just professional development sessions such as the conference mentioned, but also pairing them with time for teacher self-reflection, collaborative planning, practice, and coaching. The California Department of Education's Quality Professional Learning Standards (2015) defined this integrated system as a shift from "professional development" to "professional learning" by stating that it is "ongoing, intensive, and embedded in practice" by combining professional development sessions, peer support, self-reflection, and on-the-job practice to "improve educator practice and student results" (p. 3).

As performance accomplishments demonstrate, teachers will only accommodate new learnings into their belief systems if they prove effective, and the only way to do that is to implement them successfully time after time (Bandura, 1977b; Pajares, 1982.) One model for peer support and on-the-job practice is lesson study, where teachers collaboratively plan lessons, and then co-teach and/or observe each other delivering the lesson, followed by a debrief and revision of the lesson based on observations of student behaviors, all guided by a more experienced coach. This would help round out the district's current professional development plan into a fully developed professional learning system.

## Recommendations

This study led to recommendations for future research and practice to improve the self-efficacy of teachers who serve English Learners and thus improve outcomes for these students. These include future research on the meaning behind neutral responses on surveys and how to make LTELs and their needs visible to teachers. Recommendations for schools and districts include creating a coherent instructional program, creating a professional learning system, and addressing explicit and implicit bias.

### Future Research

Future research that would benefit this area of study would be to understand what neutral responses tell us about how teachers really feel about their self-efficacy. This study modeled measures from various studies looking at self-efficacy. The survey used a 5-point scale that allowed neutral responses and a surprising number of teachers responded "neutral" to questions about how they felt about their abilities. Forcing teachers to agree or disagree with survey items

by eliminating the neutral response might give a more accurate picture of how successful teachers feel.

A second area of research would be to examine how we might make the needs of LTELs more visible to teachers. Olsen (2010) laid out a full array of steps that must be taken to pull LTELs out of the shadows, and these include (a) informing teachers that they have LTELs in their classes, (b) utilizing assessments to identify students' specific gaps in language development and academic skills, and (c) understanding the language demands of the content they are teaching.  All of these are features of culturally and linguistically responsive teaching, but they must be applied to all English Learners, not just to newcomers, which requires understanding the heterogeneity of the English Learner population. This heterogeneity includes highly educated newcomers, grade-level newcomers, newcomers with limited or interrupted schooling, normally progressing English Learners, and Long-Term English Learners, each of which has varied instructional and social-emotional needs. One strategy for developing this understanding of EL diversity might be to stimulate empathy and awareness amongst teachers by humanizing students through including their voices in the research through interviews about their experiences.

**Recommendations for School Districts**

The shift to Common Core mathematics requires math teachers to now also be language teachers, a shift for which most are seriously underprepared due to a lack of appropriate instructional materials, teacher training in language acquisition theory and pedagogy, and time and support for teachers to learn how to integrate English Language Development into mathematics instruction (Martin & Strom, 2016; Ruffalo, 2018). In order for outcomes for

English Learners to change for the better, supports for teachers to make this shift must be implemented, as good intentions without pedagogical knowledge and skills are not sufficient to dismantle the status quo (Gay, 2018). The intent behind the Common Core State Standards is to make them accessible to all learners, and those learners are becoming more and more diverse each year, with English learners constituting upwards of 20% of the total enrollment in California public schools. Teachers in California thus have no choice but to become culturally and linguistically responsive in order to provide access to all. In order to meet this challenge, schools and districts must create a coherent instructional program that is both ambitious and equitable, and in order to do that, they must engage teachers in fully developed professional learning systems that not only develop necessary culturally and linguistically responsive pedagogy, but that also address both explicit and implicit bias.

**Create a coherent instructional program.** The district must be clear that high-quality instruction is "ambitious and equitable" as defined by Cobb et al. (2018). High-quality instruction expects teachers to:

(a) introduce cognitively demanding tasks; (b) support students to develop common language specific to key contextual features of a problem-solving scenario and to key mathematical ideas that were to be explored in the task; (c) expect students to engage in mathematical discourse in small and whole groups; (d) establish norms for explanations that include descriptions of both the steps taken to solve a problem and the rationale for taking those steps; (e) press students to elaborate their reasoning and to make connections between their peers' solutions and mathematical ideas; (f) coach students to meet expectations; and (g) attribute mathematical authority to students to position students as

competent and to maintain the rigor of the task. (p. 47-50)

In order to make that ambitious plan actually equitable for English Learners, and especially for the currently underserved LTEL population, the district must go further to ensure that all teachers develop as culturally and linguistically responsive, by learning how students acquire language and how to apply that knowledge to instruction, how to identify the linguistic features and demands of academic tasks, and how to use appropriate scaffolding so that ELs can participate successfully in those tasks (Harper & de Jong, 2004; Lucas et al. 2008). Additionally, this system must also include appropriate services for cultivating language proficiency to academic grade level, integrating home language and culture, and developing acceptance by all teachers of responsibility for both language and content-knowledge development for all students (Ajayi, 2011; Scanlan & Lopez, 2012). This is particularly important for middle school content teachers, as the math teachers in this study demonstrated a surface level understanding of the reasons for utilizing academic discourse regularly, and only one identified knowledge of language acquisition and how to apply that to instruction.

This transition has to be managed sensitively. Bunch (2013) argued that that in light of all the other demands facing them, the key to engaging teachers in changing their practice to better support English Learners was to worry less about becoming experts in language acquisition theory and to narrow the focus to identifying and understanding the language demands of their discipline and how to make their content accessible so that content teachers develop these skills in the context of the "core curricular content, understandings, and activities that teachers are responsible for (and, hopefully, excited about) teaching in the first place" (p. 298). To ensure that new information is not simply assimilated into existing beliefs, but rather

accommodated or replaced, professional learning must include conditions such that teachers find new information uncomfortable enough to cause dissatisfaction with existing beliefs, and provide intelligible and plausible new beliefs that are tested and found effective (Pajares, 1992).

**Create a professional learning system.** The transition to ambitious and equitable instruction can best be accomplished by designing a professional learning system that meets the California Department of Education's Quality Professional Learning Standards (2015) and incorporates all four of Bandura's (1977b) sources of efficacy expectations: (a) performance accomplishments, (b) vicarious experience, (c) verbal persuasion, and (d) emotional arousal.

Performance accomplishments exhibit the strongest influence on efficacy expectations by raising mastery expectations with successes and lowering them with repeated failures. This highlights the importance of collaborative planning, practice, and one-on-one coaching as part of the suite of professional development services provided at a school site. Teachers in this study highlighted the fact that this opportunity was not provided for them after a well-received summer training, and thus the momentum sparked was quickly depleted by competing interests, initiatives, and the pressure of keeping up with the pacing plan.

The second source of expectations, vicarious experience, can influence efficacy expectations through observations of others performing the threatening task and persuading observers that the act is achievable. Lesson study, a practice in which teachers collaboratively plan a lesson and then observe each other teaching it, allows teachers to see multiple and varied models of the desired behavior, to debrief what worked and what did not, and to improve the lesson delivery with each successive iteration, thus also connecting to performance mastery. Once again, teachers in this study were not afforded this opportunity, and even when it was

suggested in the interviews, one teacher shared his conflicting feelings about wanting the support but being worried about giving up the time from his other personal and professional demands. Thus, principals have to make this a priority for use of on-the-clock time, and support it by making it a positive rather than stressful experience for teachers by providing adequate class coverage with minimal extra work on the part of teachers to leave their classes in someone else's hands.

The principal is key to the successful implementation of this professional learning system through his/her influence on the work environment of teachers (Elfers & Stritikus, 2014; Jaquith, 2015; Price, 2012; Supovitz et al., 2010; Theoharis & O'Toole, 2011; Youngs & King, 2002). The strength of this influence is highly mitigated by the level of esteem held by the persuader, as well as its implementation not as a single strategy, but rather as a compliment to performance expectations and vicarious experience. Principals are also key in leading people "through suggestion, into believing that they can cope successfully with what has overwhelmed them in the past" (Bandura, 1977b, p. 198). They do this best by working through and with teacher leaders, as Supovitz et al. (2010) found that peer influence had a higher direct association with change in instruction than the principal's influence, highlighting the importance of creating a culture in departments and schoolwide where culturally and linguistically responsive teachers are leading the work. Teachers in this study talked about the need for their administration to understand the magnitude of the problem they are facing, and how grateful they were for the supports they have received. Combining the additional requested supports such as collaborative planning time and lesson study with a school environment that works to minimize pressure while building collective efficacy would improve teacher morale significantly.

Emotional arousal rounds out Bandura's (1977b) source of efficacy information, as people rely on their feelings of stress and anxiety as indicators of their perceived efficacy. A school culture of culturally and linguistically responsive teaching is difficult to maintain when politics, views on immigration and multilingualism, and differing understandings of the psychology of human behavior and motivation all exert their influence on teachers, leaving them unsure of which pedagogy to follow and with fear of retribution for getting it wrong. This highlights the importance of the two school principals demonstrating an ability to clearly communicate the mission of the organization, establish trust, create structures that promote teacher learning through the development of shared goals and meaningful collaboration, develop positive teacher-student and teacher-administrator relationships, and create a culture of innovation where it is okay to make mistakes (Elfers & Stritikus, 2014; Hall & Hord, 2015; Scanlan & Lopez, 2012; Theoharis & O'Toole, 2011;Youngs & King, 2002). This would go a long way towards addressing the teacher's concern that "we don't know what works" and reducing the pervasive anxiety around test scores in this district.

This integrated system of supports would develop not only teachers' individual sense of self-efficacy, but also collective self-efficacy, which Hattie (2017) identified as having the largest effect size (1.57) of any other school factor on student achievement. These supports must be developed at all levels of the system, so that the foundation is built strongly at the elementary level and students entering middle school are proficient in the English language as well as mathematics.

**Address implicit and explicit bias.** While teachers expressed positive attitudes overall, there were some comments that showed some deficit thinking, which is common according to

the literature. Working on addressing the biases that shape beliefs and actions could go hand in hand with improving instruction. Martin and Strom's (2016) strategy of building reflective practices to increase the number of linguistically responsive teachers could further buttress emotional arousal by asking teachers to examine the differences between their explicit and implicit beliefs, as "the reflective nature of teaching provides a natural environment for teachers to be exposed to the concept of implicit beliefs and consider their own" (Harrison & Lakin, 2018, p. 97). Incorporating these reflective practices into teacher professional development to help them gain a better understanding of their own cultural identities as well as those of their students, is critical, as

> Nisbett and Ross (1980) concluded that there is substantial evidence to suggest that beliefs persist even when they are no longer accurate representations of reality, and they could find no literature showing that individuals pursue, even in minor ways, strategies that aid in the alteration or rejection of unreasonable or inaccurate beliefs. This is not to say that beliefs do not change under any circumstance, but that they generally do not change even when it is logical or necessary for them to do so. . . Pogo's injunction that "We have met the enemy, and the enemy is us" may well be a plea for reflection on the network of inconsistent and unexplored beliefs that often give rise to perplexing behavior (Pajares, 1992, p. 317-18).

### Conclusion

This study focused on the incredible power of language, and the understanding that "it can be a barrier or a bridge to incredible possibilities" (California Education Partners, 2019). The Common Core State Standards have caused language to exert unprecedented pressure on the

content area of mathematics, a domain that relied primarily on algorithms and equations as the "universal language," catching most math teachers off-guard. English Learners are caught in the middle of this transition and sit on the precipice of success or disaster with language as the key. In this situation teachers will serve more often than not as barriers rather than bridges if all levels of the educational system do not band together to develop culturally and linguistically responsive school environments and instructional practices immediately.

Creating effective professional learning systems for teachers is essential for ending the status quo of underachievement by English Learners by developing ambitious and equitable instruction for all students. Creating these systems for teachers of mathematics is particularly important, as math is a key gatekeeper to social mobility for all students (Martin et al., 2010; National Council of Supervisors of Mathematics & TODOS: Mathematics for ALL, 2016), but most especially for English Learners. Further, the critical need to develop a citizenry competent in math (Creek, 2017; Frankenstein, 1983; Paulos, 1988) has never been more important, as the US grapples with a president who regularly shows disdain for evidence and facts, highlighting the need for an understanding of "the technical knowledge that is too often used to obscure economic and social realities" (Frankenstein, 1983, p.315).

Engaging middle school math teachers in examining explicit and implicit beliefs will engage them as critical thinkers that can question the world as it is and work towards its transformation into one that is more socially just (Darder, 2015). Often professional development is done *to* teachers, much like the banking mentality with students (Freire, 1970), and the model I propose is done *with and for* teachers as collaborators who are actively shaping their instruction based on student needs, self-reflection, and research-based strategies. Teachers can truly believe

that English Learners are capable of engaging in rigorous mathematics instruction if they have school and district leadership that creates school environments conducive to learning for all students and all *teachers*. This is accomplished by permitting teachers to experience success through collaborative planning, practice, reflection, lesson study, and one-on-one coaching, as well as the resources and tools to provide culturally and linguistically responsive strategies. Working together, we can ensure that English Learners have access to higher education, STEM careers, and economically viable futures.

## Survey Questions

Survey Questions

| | |
|---|---|
| Personal Factors | 1. The inclusion of English Learners in my classes increases my workload. |
| | 2. English Learners can be successful in learning mathematics if the teaching is effective. |
| | 3. For English Learners, learning the English language should take precedence over learning subject matter at school. |
| | 4. Having an English Learner in the classroom is detrimental to the learning of other students. |
| | 5. English Learners should not be included in general education classes until they attain a minimum level of English proficiency. |
| | 6. Content area teachers do not have enough time to deal with the needs of English Learners students. |
| | 7. Until students have learned to speak English, I shouldn't expect too much from them in my class. |
| | 8. Content area teachers are responsible for English Learners' language development. |
| | 9. English Language Development (ELD) teachers are responsible for English Learners' language development. |
| | 10. Please list or describe what you consider to be the greatest benefits of including English Learners in your mathematics classes. |
| | 11. When a student gets a better grade than he/she usually gets, it is usually because I found better ways of teaching that student. |
| | 12. If a student did not remember information I gave in a previous lesson, I would know how to increase his/her retention in the next lesson. |
| | 13. If I try really hard, I can get through to even the most difficult or unmotivated students. |
| | 14. I am able to effectively teach math to children whose first language is not English. |
| | 15. I am able to teach math to children who speak English as a second language as effectively as I am able to teach math to children who speak English as their first language. |
| | 16. I am able to effectively monitor the math understanding of children who are English Learners. |
| | 17. I continually search for better ways to teach mathematics. |

18. I know how to teach mathematics concepts effectively.

19. The inadequacy of a student's mathematics background can be overcome by good teaching.

20. I find it difficult to use manipulatives to explain to students why mathematics works.

21. When a student is having difficulty with an assignment, I often have trouble providing a starting point without lowering the rigor of the standard.

22. I am typically able to answer students' questions.

23. When a student has difficulty understanding a mathematics concept, I will usually be at a loss as to how to help the student understand it better.

Behavioral    24. I integrate English Learners' background and experiences into mathematics lessons.

Factors

25. If there were English Learners in my classroom, I would focus on math vocabulary in addition to the content.

26. I accept alternative mathematics algorithms learned by English Learners in their home countries.

27. I teach English Learners mathematics in the exact same way I teach non-English Learners.

Environmental

Factors    28. What support from your school and/or district would help you improve your ability to effectively teach English Learners?

Note. Survey items were followed with a 5 point Likert Scale with response options ranging from (1 = *Strongly Disagree* to 5 = *Strongly Agree*).

# APPENDIX B

## Semi-Structured Interview Design

1. How long have you been teaching middle school math?

2. How have things changed since you first started teaching math?
   a. Where do you see the challenges?
   b. So how does Common Core play in here, especially the expectations around language?

3. What are some of the major challenges of teaching mathematics in this school?
   a. Can you think of a time when you had a particularly challenging student, or curriculum that was particularly challenging to teach? (prompting for story)

4. Thinking of your EL students over the years - what are their characteristics? Have they changed over time?

5. In your classroom(s), when students who are English Learners don't learn as expected, what do you usually find are the reasons?
   a. Do you see it as a lack of ability, or a lack of opportunity?

6. What are some of the strategies you use when your English Learner students don't learn as expected?

7. Tell me about a time when you felt particularly successful in teaching ELs.

8. Tell me about a time when you felt particularly frustrated in teaching ELs.

9. Tell me about a time that you felt supported in meeting the needs of English learners. What did that support look like, sound like, feel like?

10. Tell me about a time that you did not feel supported in meeting the needs of English

learners. What did that lack of support look like, sound like, feel like?

11. In the survey, the following supports were identified as needed to improve instruction for English Learners:
    - **More time to teach**
      o An extra class period for math
      o We need ways to extend instructional time for these students if we expect them to move towards proficiency, such as having two periods for math each day.
    - **More in-class support**
      o In-class tutors/translators.
      o Hands on teachers/aids/support in the classroom.
      o Also a bilingual aide would also be beneficial to provide a small group instructions if the EL students are confused with the process or have clarifying questions regarding the lessons.
      o Also, having a helper/aide would help in guiding a classroom.
      o The support I would like is to have an aide to help with the new comers and maybe someone that can help with rewriting the instructions for the Spanish only students.
      o For me, I would appreciate some technology supports for students who have very little English. STMath or other conceptual math learning software where language is not necessary could be helpful in accurately assessing what students already know, but can't express in English.
    - **More time to plan, practice, and collaborate with colleagues**
      o Having more information/strategies from the ELIRT on how to best serve the needs of the EL in my math class. For example, sentence starters/sentence frames, academic vocabulary words, etc.
      o Strategies and supports from TOSA's and PD's focused on in-practice results of those strategies.
      o I need to work closely with our ELIRT and bilingual aides to support especially the newcomers, but also LTELs.
      o More time to plan lessons & collaborate with colleagues.
      o We have had a great amount of professional development in-services to address teaching English Learners.
      o Strategies are always being suggested and given to us in PDs but never ways nor time to implement what we have learned.
    - **More support from administration**
      o The support of admin in understanding what a big task this is (to develop language and mathematical understanding at the same time, especially in students who were not demonstrating grade-level math skills before entering 6th grade) is crucial.
      o Bridging the gap of 5th and 6th expectations.
    - **Fewer students**

- o Reduced classroom size.
- o I would love to have a smaller class where there are fewer students in a classroom to better help students.

Can you tell me a bit more about the support that you feel is most critical from this list and why?

12. Is there anything else you'd like to tell me about your experiences teaching middle school math to English Learners?

THANK YOU!!

# APPENDIX C

## The CCSS Standards for Mathematical Practice

MP1: Make sense of problems and persevere in solving them.

MP2: Reason abstractly and quantitatively.

MP3: Construct viable arguments and critique the reasoning of others.

MP4: Model with mathematics.

MP5: Use appropriate tools strategically.

MP6: Attend to precision.

MP7: Look for and make use of structure.

MP8: Look for and express regularity in repeated reasoning.

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