TEACHERS' BELIEFS, PERCEPTIONS, EXPERIENCES, AND STRATEGIES IN TEACHING AND ENGAGING MULTILINGUAL LEARNERS IN MATHEMATICS CLASSROOMS

By

Merve Nur Kursav

A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

Mathematics Education—Doctor of Philosophy

2022

ABSTRACT

TEACHERS' BELIEFS, PERCEPTIONS, EXPERIENCES, AND STRATEGIES IN TEACHING AND ENGAGING MULTILINGUAL LEARNERS IN MATHEMATICS CLASSROOMS

By

Merve Nur Kursav

The number of Multilingual Learners (MLs) enrolled in U.S. schools increased from 8.1% of the total student population to more than 10% between the 2000-2001 school year and the 2016-2017 school year (NCELA, 2016; U.S. Dept. of Education, NCES, 2020). Like all learners, MLs need support to ensure their engagement in mathematics classrooms (Kena et al., 2015; Silva & Kucer, 2016). While the number of MLs has been increasing, there has been limited research about how teachers support these students' engagement in content area classrooms (Hos, 2016). A notable paucity of studies focuses specifically on mathematics teachers' experiences supporting MLs' learning and engagement in mathematics classrooms (Warren et al., 2014). This study investigated mathematics teachers' beliefs, perceptions, experiences, and strategies in teaching and engaging MLs in 6^{th} -12^{th} grade mathematics classrooms. The dissertation study contributes to the field of mathematics education by providing practical and theoretical implications.

This dissertation is built on an extensive review of the relevant literature about 6th-12^{th}-grade mathematics teachers' beliefs, perceptions, and experiences in teaching and engaging MLs in the mathematics classroom. I used a combination of Teacher Cognition (TC) and Culturally Responsive Teaching (CRT) as the theoretical framework. Mixed methods were used, and data were collected in two phases: (1) quantitative data (i.e., adapted survey using Karabenick and

Noda's (2004) survey and Rhodes's (2017) CRT survey) and (2) qualitative data (i.e., teacher interviews).

Results revealed that teachers frequently used appropriate materials, instructional resources, standards, objectives, scaffolding strategies (e.g., grouping, pacing, wait time, transparency in teaching, comprehensible input), and assessment tools to support MLs' learning and engagement in mathematics classroom. Data sources clearly illustrated that teachers strongly agreed they were comfortable with having MLs in their classroom and willing to support MLs in learning mathematics by boosting their engagement. The results also showed that teachers needed to (1) learn and design strategies for academic support of MLs, (2) learn about systematic school and district resources available to support for MLs' identification and placement; (3) learn about district and school level supports available at the administrator level; (4) make data driven decisions about curriculum and instruction for MLs; (5) have more willingness to work with MLs; (6) have professional development and support for culturally responsive teaching and MLs' learning and engagement; (7) notice their beliefs about language acquisition (bilingualism and translanguaging); (8) establish inclusion; (9) encourage autonomy and cultural awareness of students and collaborative decision making with all; (10) establish trust and relationships; and (11) provide transparent feedback and assessment. It is believed that the results of the study will help teachers of MLs to comprehend the prominence of culturally responsive teaching. Additionally, implications include advising policymakers to acknowledge that covering the curriculum in a timely manner for MLs is not enough for sustained success.
Keywords: Multilingual Learners, Beliefs and perceptions, Teacher cognition, Culturally Responsive Teaching, Mathematics Teachers' Experiences

This dissertation is dedicated to my mom, dad, and sister.
Thank you for always believing in me.

ACKNOWLEDGEMENTS

My research and teaching have been inseparably intertwined, complementing my service to my profession, the university, and the public. I have been part of many NSF-funded research projects in mathematics education and STEM field that focused on justice, equity, diversity, and inclusion, including the Connected Mathematics Project (CMP), Instilling Quantitative and Integrative Reasoning Project (INQUIRE). Scholarship Program for Retaining (SPRING) at Michigan State University (MSU), Investigating Proportional Relations in Two Perspectives Project (InPrep2) at the University of Georgia (UGA), and Collaborating for English Language Learners (CELLS) at the University of Rochester. The projects have been instrumental to my growth as a researcher.

I was so fortunate to work with these great teams. First, I am thankful to Fulbright. Special thanks to my advisor, Dr. Corey Drake, for her continuous guidance, inspiration, support, and feedback. I am so grateful to my committee members, Drs. Ryan Sweeder, Rabia Hos, Tenko Raykov, and Alden J. Edson for their guidance, support, time, and attention.

CMP: I am so thankful for my professors Elizabeth Phillips, Alden J. Edson, Kristen Bieda, project coordinator, and friend Elizabeth Lozen. Very special thanks to my colleagues and friends on the CMP team: David Bowers, Chuck Fessler, Amit Sharma, Taren Going, and Sunyoung Park for all the unique research ideas we created, motivation, and showing care and compassion for another. Again, special thanks to my most excellent support (academically and socially) to David. I am also very thankful to Leilah Lyons, currently a program director in NSF, for her mentorship and encouragement when we were writing our manuscripts about the CMP Collaborative Learning User Environment (CLUE).

INQUIRE and SPRING Projects and Scholarship Undergraduate Teaching and Learning (SUTL) Fellowship: I am so thankful first to Ryan Sweeder for his mentorship, guidance, patience, caring, time, encouragement, and providing me a space where I can be myself and use my academic skillset as one of the intellectual contributors of the projects, for listening to my dreams, and for joining my graduation ceremony.

I am also so thankful to my professor Sean Valles for his collaboration with us in SPRING Project and the continuous support, attention, encouragement, and motivation he provided when we were writing our manuscripts. I am also very grateful to our amazing INQUIRE team Drs. Becky Matz and Samantha Cass for their support, motivation, long discussion for our manuscripts, and friendship. Indeed, very special thanks to Peter White, my SUTL mentor for two years, for his mentorship and support.

InPrep2 and CELLs: For InPrep2, I am very thankful to Dr. Andrew Izsák and Sybilla Beckmann for their guidance and support. Also, for CELLs and the guidance in my dissertation committee, very heartfelt thanks to Dr. Rabia Hos for her mentorship, guidance, support, encouragement, motivation, and for joining my graduation ceremony. I have very special thanks to my professor Drs. James W. Wilson, A. Kursat Erbas, Jeremy Kilpatrick, Leslie Steffe, Amy Ellis, Edward Azoff, and Prof. Chris Franklin for their support.

At PRIME, I am so thankful to my professors: Drs. Beth Herbel Eisenmann, Tonya Bartell, Ralph Putnam, and Jack Smith; Lisa Keller, Freda Cruel, and Kelly Fenn for their support. At Measurement and Quantitative Methods, very special thanks to my professor Dr. Tenko Raykov for everything I learned from him in my quantitative methods courses and Dr. William Schmidt for his support for my minor in Measurement and Quantitative Methods. At MSU, I am also very thankful to Jessica Scott-Nehls and Drs. Van Gorp Koenraad. Steve

Kozlowski, Zachary Neal, and Christine Greenhow for everything I learned in their courses and support. Very special thanks to the faculty (especially Drs. Jeffrey Choppin, Ozzy Allison, Cornelis (Kees) de Groot, Nicole Hersey, Jason Gauthier, Asli Ozgun-Koca), teachers, CMP, mathematics coaches (especially Geraldine Devine), school districts and district superintendents who supported me when collecting my dissertation data. Again, very special heartfelt thanks to my dear friends Sheri, Ibrahim, Ozdemir, Elham, Ming, Jenna, Torrey, Hannah, Cassie, Sunyoung, Taren, Rani, Jason, Valentin, Bob, Hulya, Imren, Melek, Atacan, Sami, Hasan, and Damon, for their endless support.

My most heartfelt thanks, first and foremost, to my father Mustafa, my mother Fahriye, and my sister Müberra for all the sacrifices they have made, their endless love, and the dedication they have shown to my education. Very special thanks to my cousins, especially Ferhat and Özgül for their constant support during my Ph.D. Last but not least, thanks to my dear grandmother Fatma who may have passed on, her memories would always live on within us. Thank you for your sacrifices, care and concern, love, and everything you have done for me. I will be forever grateful that you are my grandmother. Wherever you are, I know you are in a much better place.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1: INTRODUCTION

I'm thrilled that someone's voice is coming in, and I hope you shake it all up. Set the world on fire because we needed it. We did not want our MLs talking in their native language when I started teaching. It was verboten. They could not speak to each other in their language. That was bad. Now we're kind of like, oh, it's okay! Things change as we spend some time doing all this, but it takes a few people coming in and rocking the boat and saying, this is what we need to do. This is how we need to make a change. So, people like you are getting to see the backside and what's going on and be able to take that down your dissertation and apply it in a big way. That's wonderful. Because the people like me in the field, we were ready to take it up and absorb it!

Participant Teacher

Language diversity in schools is expanding. The number of students whose native language is not English has steadily increased in the U.S. (U.S. Department of Education, 2020). Students who are in the process of learning English as an additional language are often referred to as Multilingual Learners (MLs) (U.S. Department of Education, 2016). There have been multiple other terms used to label students whose native language is not English, including English as a Second Language (ESL) Student, Limited English Proficient (LEP), Language Minority Student, English learner (EL), Culturally and Linguistically Diverse (CLD), emergent bilingual, multilingual, and so on. Although the inconsistent use of a common term is confusing (Paulson & Armstrong, 2010), the most recent acceptable term that takes into account an asset view uses Multilingual Learners (ML). Therefore, the term ML is used throughout this dissertation.

MLs' language abilities in English range on a continuum of proficiency from knowing only a few words to being competent enough to achieve proficiency in the academic language in a specific content area such as mathematics. To gain mathematical competence and proficiency, MLs (and all students) need to be equipped with the following skills and attitudes: (1) learn to value mathematics, (2) become confident in their ability to do mathematics, (3) become mathematical problem solvers, (4) learn to communicate mathematically, and (5) learn to reason mathematically (NCTM, 2000). Mathematically engaged students actively participate in group discussions, genuinely value their mathematics learning measured through positive changes in student achievement (Anderman et al., 2001), and reflectively get involved in a deep understanding of mathematical concepts and applications. These skills and attitudes require linguistic competence in the English language in U.S. classrooms. Only through proficiency with these linguistic skills and attitudes can MLs be engaged in mathematics. Through engagement in mathematics, they can (1) incorporate mathematical content and interaction (Erickson & Shultz, 1992; Greeno, Benke, Engle, Lachapelle & Wiebe, 1998), (2) make sense of mathematical topics or tasks (thus satisfying the second NCTM component from above), (3) expose their thinking, making, and arguing mathematical claims (Lampert, 1990) (thus satisfying the fourth and fifth NCTM components), and (4) solve problems (thus satisfying the third NCTM component).

Given the linguistic demands of the skills and attitudes listed above and the linguistic needs of MLs, in order for them to fully participate, learn, and engage in the mathematics classrooms, they need to be supported to do so (Varlas, 2018). Full participation is required to achieve learning and engagement and teachers play a critical role to help students fully participate (Hill, Rowan & Ball, 2005). In supportive and motivating teaching and learning environments, teachers' support for independent problem solving through scaffolding, feedback, and encouragement is emotionally, cognitively, and academically helpful for students' learning and engagement (Dolezal, et al., 2003; Skinner & Belmont, 1993). Additionally, teachers plays a vital role for their students' engagement in the mathematics classroom as they are the core enactors of best pedagogical practices (Kursav, 2020; Walshaw & Anthony, 2008). Thus, teachers' beliefs, perceptions, experiences, and classroom strategies impact how students perceive and learn mathematics, mathematical competencies, identities, and social and civic participation in mathematics. However, historically, teachers have lower expectations for minoritized groups of students (Walshaw & Anthony, 2008). While linguistic diversity is expanding in mathematics classrooms, teachers struggle to meet the needs of diverse groups of students (Estrada, 2014).

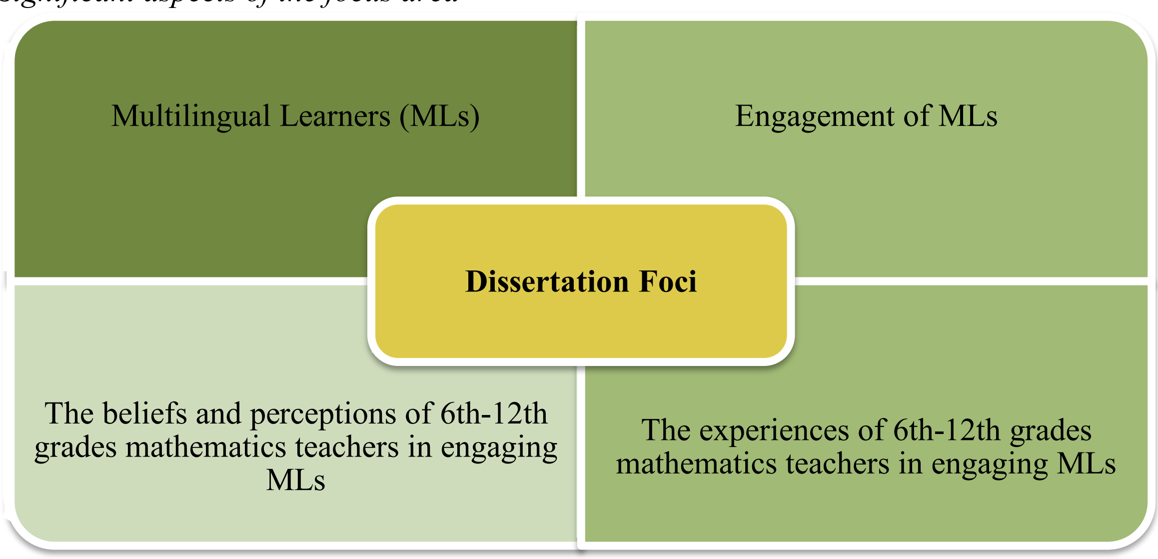
Problem Statement and Significance

The number of MLs has been steadily increasing over the past decade, so mathematics teachers face more challenges in combining language and mathematics instruction (Moschkovich, 2013). Among other factors, these challenges can also be exacerbated due to not having enough training and experience in meeting the needs of language learners, teachers' inherent beliefs and perceptions about MLs, and not being aware of the specific needs of MLs' learning and engaging in mathematics classrooms (Freeman & Crawford, 2008; Zaslavsky, 1994). In general, teachers may have lower expectations for MLs in their classrooms; for example, according to Nora and Echevarria (2016), teachers often question if MLs are "capable of learning alongside their English-speaking peers" (p.6). Nora and Echevarria also stated that MLs are portrayed by teachers on what they cannot do; for example, they cannot "speak English, be prepared for mainstream classrooms, understand the culture of schools in the United States" (p.7) and "their parents don't speak English and cannot help them with their schoolwork, so they do not do as well academically, and so on" (p.7). These consign MLs' academic standing to a negative label of diminished capacity.

There is a positive relationship between MLs' school experiences and their teachers' beliefs and perceptions (McSwain, 2001). There is a need to determine how mathematics teachers' beliefs and perceptions affect their teaching practices and how they fare in accommodating MLs in their classrooms (Turner et al., 2012). While a body of literature proposes effective ways of teaching MLs in mathematics classrooms (de Araujo et al., 2018), minimal research documents how teachers utilize effective methods of teaching and engaging MLs in mathematics classrooms (Moschkovich, 2010, 2012), and there is a paucity in the research to date focusing on beliefs, perceptions, experiences, and strategies of mathematics teachers related to MLs' engagement in mathematics (Coggins, 2014; Freeman & Crawford, 2008; Moschkovich, 2010, 2012).

The rationale of conducting this study with 6th-12th grade teachers is that 6th-12th grades have a pivotal role in a student's career, and they need to engage in mathematics. Many students acquire the skills to read, solve problems, and communicate using technical language in the 6th-12th grades. The dissertation includes the following topics as the primary focus: (1) MLs, (2) engagement of MLs in the mathematics classroom, (3) 6th-12th grades mathematics teachers' beliefs, perceptions, experiences, and strategies with MLs, and their needs to support MLs' engagement in the mathematics classroom (see Figure 1). I describe the topics outlined above and explain the rationale behind each aspect in the following chapters.

Figure 1.
Significant aspects of the focus area



In addition to the literature review that sets the stage, the theoretical framework of teacher cognition and culturally responsive teaching along with a mixed methods approach for data collection and analysis make this study significant to the field.

Purpose

This dissertation explores mathematics teachers' beliefs, perceptions, experiences, and strategies in teaching MLs in 6th-12th grade classrooms and the relationships among those beliefs, perceptions, and experiences. Investigating teachers' beliefs, perceptions, experiences, and strategies is crucial because there is a positive relationship between teachers' beliefs, perceptions, experiences, and strategies and their students' engagement, motivation, and success (Archambault, Janosz & Chouinard, 2012). The findings from this study will provide insights to researchers, practitioners, and policymakers to better understand the experiences of mathematics teachers teaching MLs in secondary school classrooms. My research questions are:

- What are the beliefs and perceptions of mathematics teachers in engaging MLs in 6th-12th grade mathematics classrooms?
    - How do these teachers' beliefs and perceptions differ with respect to gender, training, educational level, years of experience, race, level of education, and language assistance?
- What are mathematics teachers' experiences engaging MLs in 6th-12th grade mathematics classrooms?
    - How do teachers' experiences differ with respect to gender, training, educational level, year of experience, race, level of education, and language assistance?
- What strategies do mathematics teachers use to engage MLs in 6th-12th grade

classrooms?

- How do these teachers' strategies differ with respect to gender, training, educational level, years of experience, race, level of education, and language assistance?

Organization of the Dissertation

The dissertation is organized into seven chapters involving (1) an introduction including the problem statement, significance, purpose, and research questions of the study, (2) the review of the literature including the background of the study, and (3) the theoretical frameworks that the dissertation study drew on: Borg's (1999) Teacher Cognition (TC) framework and Ladson-Billings' (1994) Culturally Responsive Teaching (CRT) framework, (4) a description of the methods and analytical framework, validity, ethical considerations, and positionality statement, (5) findings, (6) discussion, and (7) conclusion and implication for the dissertation study. The appendices provide the Institutional Review Board Protocol, letters of information for the participants, the surveys and the interview protocols used, and data tables.

CHAPTER 2: REVIEW OF THE LITERATURE

In Chapter 1, I offered a brief introduction to MLs and teaching MLs in mathematics classrooms. This chapter provides a comprehensive review of the extant literature on MLs' engagement in mathematics classrooms and teachers' experiences and challenges of teaching MLs in secondary school classrooms in U.S. schools. The review of literature is organized into three sections: (1) background, including definitions of concepts such as students' engagement in the mathematics classroom, who MLs are, and equity for MLs, (2) teachers' beliefs and perceptions about MLs, and (3) what teachers can do to support MLs.

Background Information

Prior to using terms, it is important to clarify their meaning. This section provides the definitions of concepts such as students' engagement in the mathematics classroom, MLs, and equity.

Students' Engagement in Mathematics Classrooms

Student engagement is associated with improved academic achievement, social and emotional well-being, and successful long-term outcomes (Klem & Connell, 2004). Engagement is defined as students' participation and interaction with others (Engle & Conant, 2002). Engagement happens when students in small groups contribute to the discussion in coordination with others (Engle, 2012). Engagement is dynamic, context-dependent, and interactive (Goldin, Epstein, Schorr, & Warner, 2011). Engagement indicates the extent to which students are actively involved with the content of a learning activity (Ainley, 2001; Helme & Clarke, 2001). When students are engaged, they take ownership of their learning (Corno & Mandinach, 1983; Pintrich, 1989; Zimmerman, 1990). Students who take charge of their learning experience rather than just passively receiving it as a given set goals, make plans to learn, evaluate themselves, and have a better sense of control over their learning processes and consequences (Zimmerman, 1990). This, in turn, influences their academic outcomes by promoting engagement with learning (Ainley, 1993) and helps them become passionately engaged in mathematics. Engagement can also be defined as "students' psychological investment in an effort directed toward learning, understanding, or mastering the knowledge, skills, or crafts that academic work is intended to promote" (Newmann et al., 1992, p. 12). Newmann (1991) added that engagement is not simply a commitment to completing assigned tasks or acquiring high-performance symbols such as grades or social approval. Engagement includes work coordinated between individuals and groups, where “action [is] informed by meaning drawn from a particular group context” (Cook & Brown 1999, p. 387).

Actively engaged students are more eager to take up challenging tasks, spend the effort to use various problem-solving strategies, persist in completing tasks (Stipek, 1996; Sullivan & McDonough, 2007), use evidence in scholarly ways, develop arguments, and generate questions (Engle & Conant, 2002). Genuine discussions of mathematical problems enable students to know what they should be doing and to continue productively thinking about mathematics (Leinhardt & Putnam, 1987). Knowing what to do and thinking about mathematics allows students “to be courageous and modest” in exposing their thinking, making, and arguing mathematical claims (Lampert, 1990). Engagement is genuine when students “make intellectual progress or, in more colloquial language, get somewhere” (Op ’t Eynde, 2004, p. 403). Op ’t Eynde (2004) proposed that engagement has a solid connection to mathematical learning, and students’ engagement in mathematics is vital to knowledge acquisition for their continued participation in mathematics. Learning in mathematics often occurs through engagement in the language and practices in the mathematics classroom, so engagement in mathematics can be viewed as synonymous with learning (Op 't Eynde, 2004).

Who are MLs? How are They Portrayed by National Policy and Assessment Reports?

MLs are students from non-English speaking homes who learn English as an additional language (Education Commission of the States, 2014). According to the National Center for Education Statistics (2016), MLs made up 10% of the US student population in 2016-2017. It is estimated that by 2025, 25% of all students in public schools will be MLs, including immigrants, migrants, refugees, and long-term MLs (Wright et al., 2015). States might have slight differences in the wording of their definitions of MLs, but the ideas are similar, and so are the needs of the defined individuals. Although many MLs may have developed basic communication skills in English, they often continue to struggle with academic language (Samson, 2012). This makes content learning difficult and requires scaffolded and modified instruction to meet the needs of MLs.

According to the, Every Student Succeeds Act (ESSA, 2016), MLs are entitled to "participate meaningfully and equally in education programs and services" (p.2). This requirement is supported by the Common Core State Standards (CCSS) for Mathematics, which require all students, including MLs, to meet the demands of the standards. However, many content teachers do not have the necessary training to support MLs to meet the standards (Education Commission of the States, 2014). While ESSA and states that mandate CCSS mandate all students, including MLs, to meet the standards, the discrepancy between the academic achievement of MLs and their native English-speaking peers is a big concern for many educators, as evidenced by the results from the National Assessment of Educational Progress (NAEP, 2019). NAEP data shows that 84% and 94% of fourth and eighth-grade MLs scored below proficient in mathematics compared to 56% and 64% of fourth and eighth-grade non-MLs, respectively (National Center for Education Statistics, 2019).

Standards highlight the emergent need for language improvement to communicate in the core content areas (e.g., ELA, mathematics, science, and social studies) and set goals for teachers to support students' achievement within these disciplines. The TESOL Pre-K-12 English Language Proficiency (ELP) Standards include:

> English language learners:
>
> (1) communicate for social, intercultural, and instructional purposes within the school setting; (2) communicate information, ideas, and concepts necessary for academic success in the area of language arts; (3) communicate information, ideas, and concepts needed for academic success in the area of mathematics; (4) communicate information, ideas, and concepts required for academic success in the area of science; (5) share information, ideas, and concepts necessary for academic success in the area of social studies; (6) address the academic and basic language skills and competencies ELLs must master for success in and beyond the classroom. (TESOL International Association, 2019, p.1)

In addition to the international governing organization of TESOL that focuses on teaching MLs, World-Class Instructional Design and Assessment (WIDA), established in 2003, is an educational consortium of state departments of education that is a driver of equity for MLs in curriculum, instruction, and assessment and rooted in equity and a commitment to high-quality education. 40 U.S. states and the District of Columbia, Puerto Rico, and the Northern Mariana Islands participate in the WIDA Consortium. Also, the standards that WIDA has released are categorized into four language domains: Listening, Speaking, Reading, and Writing, and six language proficiency levels: Entering, Beginning, Developing, Expanding, Bridging, and Reaching PreK-12. WIDA 2020 standards guide educators to:

> (1) set high expectations for all students; (2) provide access for multilingual learners to rich, standards-based, grade-level content, including by scaffolding up (see the WIDA website for resources about scaffolding); (3) enact linguistically and culturally sustainable pedagogies; (4) create opportunities for multilingual learners to; (5) engage actively with each other in deep learning, and (6) access and use multiple languages, including through translanguaging. (p. 18)

As seen in WIDA's standards on content and language integration, teachers can support MLs for content and language concurrently (i.e., academic content as a context for language learning and language as a means for learning academic content). With WIDA's focus on MLs' development in both language and content using multiple means of communication, students can engage better in the content areas with the use of spoken and written language, gestures, facial expressions, images, equations, maps, symbols, diagrams, charts, videos, graphs, computer-mediated content, and other means (WIDA 2020, p. 19). Therefore, MLs can (1) understand the connections between content and language, (2) make meaning within and across content areas (disciplines), (3) interact with each other in challenging content activities, and (4) coordinate design and delivery of curriculum, instruction, and assessment (p. 19). Thus, MLs can engage fully in content learning and leverage their assets to support their academic achievements.

While there have been many measures, standards, and policies developed in the past twenty years to provide MLs with rigorous and equitable instruction, progress in the academic achievement of MLs has been slow. This is partly due to a lack of teacher preparation, including a specific focus on MLs and their needs. This creates a wider gap in terms of equitable teaching and learning opportunities. In the next section, I discuss the issue of equity for MLs.

Equity for MLs

There are structures in place to promote equitable resources to all students. However, socially ingrained inequities are still rooted in historically racist systems. Numerous barriers can prevent MLs from having access to good instruction. These barriers include teachers' attitudes and beliefs, access to rigorous curricula, low expectations for MLs, and other institutional practices. Although teachers often mean well in meeting the needs of all students, the inherent, unconscious biases that they may hold against these students can prevent them from reaching these students.

Equity in mathematics education is defined as being committed to providing access and instruction to all learners (AMTE, 2015). Equity is framed around four dimensions: access, achievement, power, and identity (Gutierrez, 2009). While many studies have been related to providing equitable mathematics education for all students in the past two decades, progress and change have been slow (Sleeter, 2012). The release of the National Council of Teachers of Mathematics (NCTM)'s Principles and Standards for School Mathematics (PSSM) in 2000 and the No Child Left Behind (NCLB) Act in 2001 were meant to provide opportunities for all students to learn mathematics. While NCTM standards provided a framework for mathematics curriculum, instruction, and assessment, NCLB created a structure for testing, accountability, and quality of teachers.

Meanwhile, NCLB's structure for accountability caused tension among educators because of its emphasis on students' test scores rather than focusing on strategies to enhance student's learning and well-being (D'Ambrosio & Kastberg, 2008). After two decades of various policy changes and the development of curricular and advocacy work in the field, research points out that teachers are not fully prepared to teach students from diverse backgrounds (Kitchen 2005; Sleeter 2001; Turner et al., 2012). Due to their related linguistic struggles, these students can have challenges in the mathematical thinking and learning processes (e.g., Carnoy & Rothstein, 2013; Duncan & Murnane, 2012; Rizzuto, 2017). For these students, having an inclusive mathematics teaching and learning environment that considers the needs of learners would be an essential step in working toward a more equitable mathematics classroom. While the implementation of NCLB for over a decade maintained the status quo at best and created a wider gap between privileged and disadvantaged students at worst, NCTM standards introduced and emphasized the issues of equity in teaching.

NCTM's equity principle is based on the importance of "a classroom, school, or district where all students have access to high-quality, engaging mathematics instruction. There are ambitious expectations for all, with accommodations for those who need it" (p. 3). The principle pointed out that to achieve equity in teaching mathematics, there is a need for "high expectations and worthwhile opportunities for all" (p. 12) and "resources and support for all classrooms and all students" (p. 14). NCTM standards help teachers view every student as capable of doing mathematics. With an emphasis on equitable mathematics education through the NCTM's principles, there have been efforts to align curricula to meet the needs of an increasingly diverse body of students. With this in mind, looking at teachers' experiences and challenges is essential in understanding what lies behind the slow progress in improving the educational experiences of MLs.

Teachers' Beliefs and Perceptions about MLs

Many research studies on teaching and teachers have focused on the psychology of teaching. This consists of teachers' thought structures, including knowledge, beliefs, perceptions, attitudes, and teachers' thought processes, including planning, decision-making, and reflection (Green & Hood, 2013). Especially in teacher research, numerous studies have focused on teachers' beliefs and perceptions (e.g., Beswick, 2012; Buehl & Beck, 2015; Schraw & Olfson, 2015; Shulman 1986, 1987; Tan, 2011). Shulman (1986) asserts that teaching knowledge will not advance until research focuses on teacher cognition (TC). Beliefs are inherent and dispositional states of mind, while perceptions are formed by environmental interactions around us (Smith, 2001). This discussion is elaborated on in Chapter 3 below.

There is an increasing demand and need for innovation in mathematics teaching (Moschkovich, 2012; Schoenfeld, 2006). Innovation is needed to improve teachers' practices so students' learning can be impacted. To meet the needs, teachers should adopt new approaches to their teaching and improve their knowledge as facilitators in the mathematics classroom. Implementation of the innovation in the mathematics classroom also requires understanding how teachers' knowledge, beliefs, and perceptions provide a foundation for their classroom practices and teaching. Teachers' beliefs, perceptions, and knowledge of mathematics influence their mathematics teaching because these cognitive structures have been stored as schemas in teachers' minds (Leder & Forgasz, 2002). Sowder (2007) states that "teachers' core beliefs need to be challenged before change can occur" (p. 160). This indicates that beliefs are often strong predictors of teachers' practices. Sowder's (2007) study shows a significant relationship between teachers' beliefs and practice in teaching MLs in the classroom, but there are not consistent findings (Stipek, 2001).

Reeves (2006) surveyed 279 content high school teachers about their beliefs about MLs in the content classrooms. She identified four significant findings: 1) teachers have misconceptions about MLs and how languages are learned, 2) teachers are hesitant to receive professional development on MLs, 3) teachers' overall attitudes toward MLs are different than attitudes toward using inclusive practices for MLs, and 4) teachers are worried about the fairness of modified content for MLs. Additionally, Karabenick and Noda (2005) surveyed 729 teachers about their beliefs toward MLs. They found that teachers had misconceptions about MLs and their language acquisition process. Penfield (1987) conducted a study with 162 New Jersey content classrooms about their perceptions of MLs and ML teachers. In her research, teachers thought that the academic challenges of the MLs were due to their "laziness or lack of effort" (Penfield, 1987, p. 31). Similarly, Sharkey and Layzer (2000) found that teachers may be well-meaning, but they often have low expectations for MLs, for which they used the term "benevolent conspiracy" (p. 3). Additionally, Ortiz-Franco (2005) highlights that teachers' low expectations toward MLs can lead to poor mathematics achievement). Cummins (1997) asserts that content teachers need to understand that they are also responsible for the MLs' education in their classrooms. This suggests that professional development and training on MLs are necessary to rectify the misconceptions mathematics teachers may have about MLs (Karabenick & Noda, 2005). This dissertation study attempts to understand 6th-12th grade mathematics teachers' knowledge, beliefs, and perceptions about MLs and how they may affect their classroom teaching practices.

What Can Teachers Do to Support MLs?

In the classroom, teachers' efforts to encourage students to observe, ask questions, interpret, evaluate, discuss, and have agency in their learning are critical for students' learning and engagement (Zimmerman, 1990). To promote students' learning and engagement in the mathematics classroom, teachers should teach mathematics through student-centered instructional methods (Prince & Felder, 2007) and try to get to know students and their families to create positive relationships between them and their students. Student-centered methods of instruction can support all students' learning and engagement in mathematics through inquiry (Savin-Baden & Major, 2004). Yackel et al. (1990) claimed that mathematical knowledge could not be transferred simply from a teacher's instruction but must develop from participation in inquiry-based learning activities instead. When teachers promote student-centered learning, students are more likely to comprehend what they learn and bring up their elucidations. The students then become agents of their learning. To achieve this goal of having student-centered mathematics classrooms and promoting students' engagement, teachers must possess the prerequisite content knowledge and pedagogical content knowledge to carry this out (Magnusson & Palincsar, 1995). With sufficient content and pedagogical knowledge, teachers can help students have multiple learning experiences and develop deeper understandings of concepts (Tobin & Fraser, 1991). Moreover, they can be aware of how to approach students when they solve problems, analyze situations, and reason mathematically without telling them the answer (Flick, 1995). This holds all students engaged in the mathematics classroom, including MLs and students with special needs.

On the one hand, learning and using the language of mathematics is challenging for all. Learning mathematics in English –when students are learning English simultaneously–requires MLs to participate in an academic discourse that might be different from discourse practices at home (Moschkovich, 2002). These academic discourse practices do not only require cognitive learning but also require students to participate in socio-cultural practices and communities

(Moschkovich, 2002) in mathematics classrooms. For students' participation in the discourse, the language of mathematics has a vital role in the learning and understanding of mathematical concepts for all students to help them comprehend the mathematical abstractions (Sfard, 2008). All students need to learn the mathematics vocabulary, construct meaning, and participate in discourse (Moschkovich, 2002).

On the other hand, it might be more challenging to learn and use the language of mathematics for students whose language of instruction is not familiar and the language of mathematics is not acquired yet (Bose & Choudhury, 2010; Setati, 2005). Therefore, learning the language of mathematics is challenging itself; adding language barriers may make success unreachable for MLs without additional support. A common assumption is that mathematics is a universal language because numbers and symbols do not differ across national contexts. However, this assumption is not valid in practice because learning and understanding are not solely dealing with numbers and symbols. It is more about using them in mathematical problem solving and working on linguistically complex practices such as defining, explaining, and justifying (Moschkovich, 2015). These mathematical practices are central to U.S. Common Core State Standards for Mathematics [(CCSS], National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010). It is a fact that the implementation of CCSS with its mathematical practices has added pressure on MLs and their teachers (Moschkovich, 2015). Thus, this pressure obliges teachers to solve the lingering question: how to teach mathematics efficiently to MLs (Barwell et al., 2017).

With the pressure and requirements of implementing CCSS in mind, teachers must find efficient ways of teaching mathematics to help all students, including MLs. Indeed, this is not an easy task. Still, it is vital to navigate how to make math lessons more accessible to MLs by building background knowledge, increasing student language production, explicitly teaching academic language, and helping them engage in mathematics as an ultimate goal of teaching. When students are involved in mathematics classrooms, they are expected to develop mathematical concepts, do mathematics, and make sense of the concepts (Leatham et al., 2015) in collaboration with others. These expectations require MLs to communicate and interact with others in the classroom to engage in mathematics (Engle & Conant, 2002). Thus, teachers can capture their thought patterns, interaction, and communication (Herrenkohl & Guerra, 1998) with others. Proper and helpful communication necessary to learning and engaging in mathematics requires the mastery of language, both social and academic. While social language is needed in the classroom for everyday interactions (Cummins, 2005), academic vocabulary is used to acquire new knowledge and skills for a deeper understanding of concepts to participate in content-rich discourse effectively (Cummins, 2005; Scarcella, 2003). MLs need to acquire academic and social language (and literacy skills) to fully engage in the mathematics classroom.

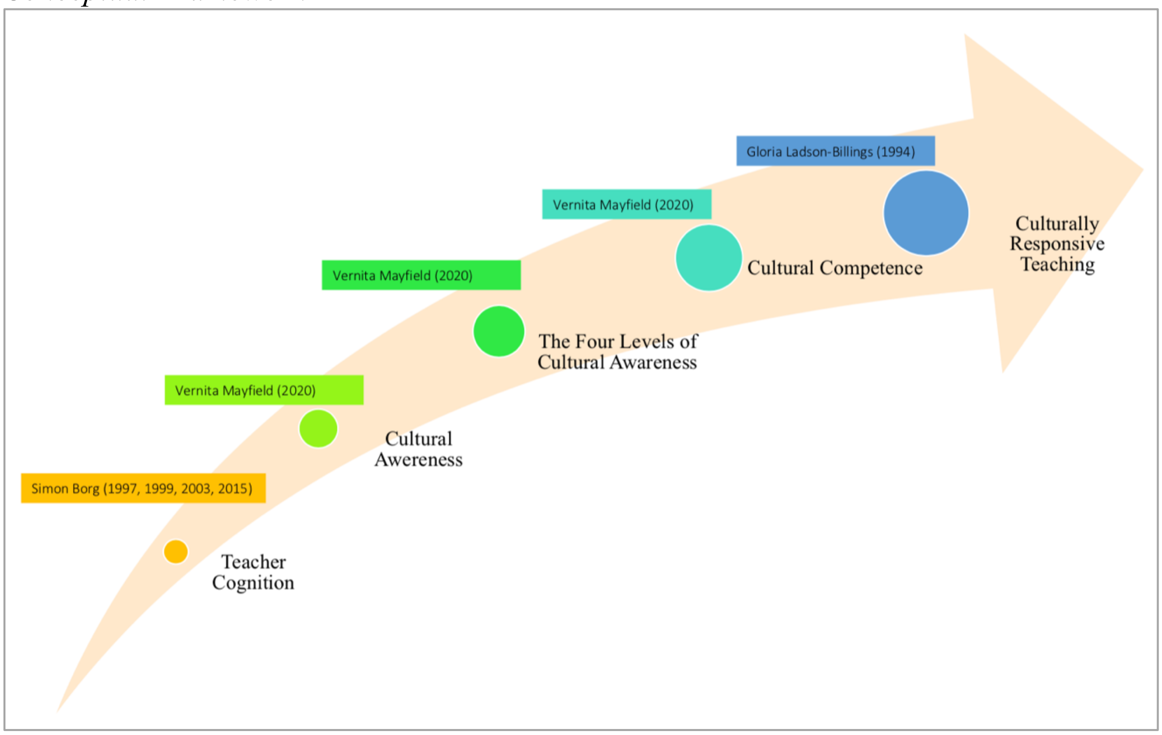
It is crucial to comprehend that every student is unique and has different cultural values, comes from a variety of socioeconomic statuses, does not have equal opportunities or access to learning materials in their homes, and has individual beliefs. All students bring their beliefs, knowledge, and experiences to the classroom. Teachers are responsible for learning more about the backgrounds, values, histories, practices, and traditions of these students and their families. Getting to know students and their families is more likely to create positive relationships between teachers and MLs and potentially change how teachers provide their mathematics instruction. Through a better understanding of their students' backgrounds, teachers can utilize these as tools to further establish connections with their students, allowing for the implementation of culturally responsive teaching.

More specifically for MLs, mathematics teachers should pre-teach and review content-related vocabulary (e.g., divisor, denominator, quotient, coefficient), use manipulatives or technology, modify their talk, practice the wait time, elicit nonverbal responses (e.g., a thumbs up or down), use sentence frames and sentence stems, design questions and prompts for different proficiency levels, supports student responses, consider language and math skills when grouping students, utilize partner talk, facilitate the group work, and ask for choral reactions from students (Barwell, 2020; Crandall, 1987; DelliCarpini, 2014; Ingram, 2020). Research studies have shown that MLs in U.S. schools have been served poorly, as evidenced by assessment scores and high school graduation rates (Gándara & Contreras, 2009; Menken, 2013). Although MLs can participate in group discussions about mathematical ideas, they still struggle to explain their reasoning to others (Turner et al., 2012) because of linguistic challenges. To help MLs improve their participation in the mathematics classroom, teachers sometimes choose to use a simplified language to ease the communication with MLs about the mathematical concepts, ideas, and understanding (Takeuchi, 2015; Wong-Fillmore, 1982). However, this strategy may not necessarily serve well to MLs' long-term positive learning outcomes in mathematics classrooms (Bautista & Mulligan 2010; Warren & DeVries 2009). Even though it might result in over-simplifying the mathematical concept under consideration, this can prevent MLs from learning the concepts (Valdés, 1999). It is crucial to pay attention to the fact that MLs' language abilities range on a continuum of proficiency, from knowing only a few words to being proficient enough to achieve the proper usage of academic language in a specific content area. Exploring the needs of MLs as it pertains to mathematics classrooms is both critical and timely. The following section presents the conceptual frameworks that build the foundation for my dissertation study.

CHAPTER 3: CONCEPTUAL FRAMEWORK

The framework for this study comes from the literature on (1) Culturally responsive teaching (Hammond, 2015; Ladson-Billings, 1994) and (2) Teacher cognition (Borg, 1999). Under the CRT phenomena, I also included the discussion about cultural awareness, the four levels of cultural awareness, and cultural competence. Figure 2 shows how my research is the synthesis of all these perspectives.

Figure 2.
Conceptual Framework



The Rationale for Framework Choice

I used Borg's (1999) framework: TC and Ladson-Billings' (1994) framework: CRT. Ladson-Billings (1994) defines culturally responsive teaching as one "that empowers students intellectually, socially, emotionally, and politically using cultural referents to impart knowledge, skills, and attitudes" (pp. 16–17). TC is an inclusive term to embrace what teachers think, know, and believe and the relationships between these mental constructs. Teachers' experiences can inform their cognitions about teaching and learning throughout their careers (e.g., Reynolds 1992). Teachers' cognition can shape their classroom practices (Borg, 2003). Utilizing both frameworks in this research (specifically with 6th through 12th grade mathematics teachers) provided a solid theoretical foundation for my research.

While mathematics education is becoming more standardized with multiple accountability measures, achieving an understanding of each of our students requires skillful teaching based upon the main tenets of CRT. While CRT research in different fields of education has been conducted widely, there is a need for research focusing on CRT in mathematics teacher education (e.g., Abdulrahim & Orosco, 2020; Driver & Powell, 2017; Ukpokodu, 2011).

I investigated teachers' beliefs and perceptions about all aspects of their work and experiences working with MLs and how they can support students' engagement in mathematics. There is a bidirectional relationship between CRT and TC (Civitillo et al., 2019). TC is a broad framework that provided me with theoretical foundations to understand teachers' beliefs and perceptions. CRT complements this focus on cognition by endorsing positive beliefs and perceptions about diversity and supporting teachers' becoming reflective practitioners (Gay, 2010). In this process, their experiences as learners and teachers influence their cognition (Reynolds, 1992), affecting their perspective of being culturally responsive to others. In the next section, I present an overview of the frameworks of TC and CRT, respectively.

Teacher Cognition

I focused on teachers' beliefs and perceptions in my research, specifically using the TC framework (Borg, 1997, 2003, 2015). In Borg's framework, TC indicated teaching's unobservable cognitive dimension, such as what teachers know, believe, and think. According to Borg (1995), TC research is crucial in the teacher education and professional development contexts. Investigating especially beliefs of preservice teachers can inform the design of preservice courses. Finally, TC research identifies if and how teachers' beliefs change through a professional development context (Borg, 2011).

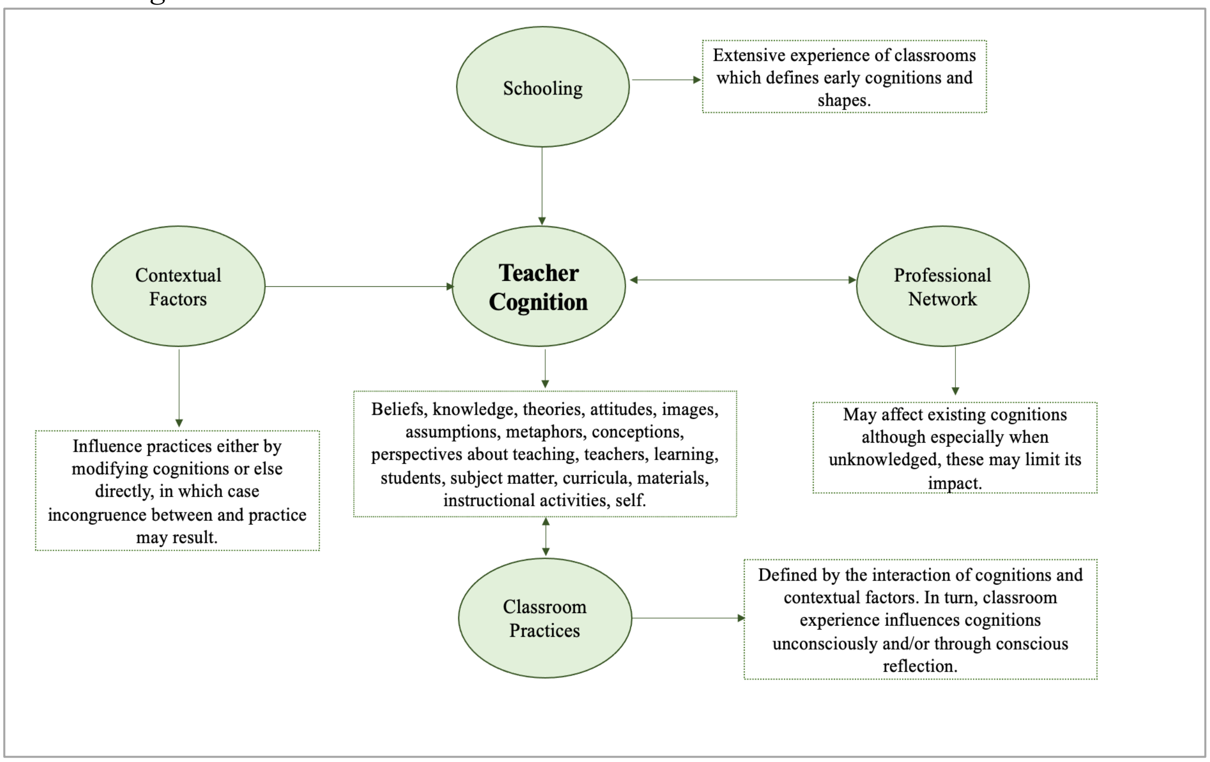
The conception of teaching is the "active decision-making informed by teachers' cognitions" (the beliefs, knowledge, theories, assumptions, and attitudes about all aspects of their work). Borg (1997) created a diagram (see Figure 3) for teaching cognition within which TC plays a pivotal role in teachers' lives. The chart outlines relationships among TC, teacher learning through schooling and professional network, classroom practices, and contextual factors. Borg (1999) stated that the construct of TC has been widely examined in various instructional settings for both preservice and in-service teachers at the different levels in the other content areas (English, mathematics).

In the literature, considering all components of the TC and their relationships in the classroom, teachers (1) serve the common good, (2) teach lessons, (3) accommodate diverse students' learning, and (4) promote their students' involvement, (5) distribute wealth (Bailey, 1996). They are concerned with their students' (1) affective involvement, (2) background knowledge, (3) cognitive processes assumed to facilitate learning, (4) usage of language, (5) guidance, (6) classroom management (Breen, 1991), (7) the learning process (8) particular attributes (9) use the classroom resources to optimize learning, (10) learning , (11) specific contributions (Breen et al., 2001). At the contextual level, teachers think about (1) the institutional culture and (2) their beliefs about language, learning, and learners' thinking about specific instructional activities (Burn, 1996). At the pedagogical level, teachers' knowledge about (1) how to manage specific language items so that students can learn them, (2) the students and what they bring to the classroom, (3) the goals and subject matter of teaching, (4) techniques and procedures, (5) appropriate student-teacher relationships, and (6) evaluating student task involvement and progress during the lessons matter in their teaching (Gatbonton, 1999). Teachers' instructional decisions can be influenced by students' background knowledge, involvement, language use, and teachers' role as facilitators or authority (Breaan, 1991). A broad set of interconnected beliefs influence and shape teachers' practice: the beliefs they hold about language, beginning language learning, and learners; beliefs relating to the school culture they work in, and their beliefs about specific instructional tasks and materials (Borg 2003).

There is a significant relationship between teachers' beliefs and their implementation of teaching practices with MLs (Basturkmen, 2012; Johnson, 1992). Teachers' instructional practices are also influenced by their inherent beliefs about teaching MLs (Borg, 2003; Johnson, 1994). Additionally, teachers' philosophy about language teaching and learning affects their instructional decisions (Nunan, 1992). While many mathematics teachers may not be aware of their pre-existing beliefs about language learning and teaching, it is important to gather evidence on teachers' inherent ideas and how this might impact their instructional practices while teaching MLs. Teachers' beliefs about language learning and teaching are critical in influencing instructional decisions (Richards, 1998); therefore, my dissertation study integrated teachers' beliefs and perceptions. A teacher often plans lessons according to their principles about teaching and then modifies their approaches according to their students' needs. These modifications are often based on their own beliefs, assumptions, and knowledge about learning and teaching (Ulichny, 1996).

For the teaching of mathematics, one of the critical factors is the psychological basis of teaching mathematics which consists of the teacher's knowledge, beliefs, and attitudes. The knowledge (pedagogical, subject matter knowledge, and curricular), beliefs, and attitudes of the mathematics teacher and their relationship with practice were investigated as TC (Borg, 2003).

Figure 3.
Teacher Cognition Framework



As is seen in Figure 3, the definition of TCs includes beliefs, knowledge, and reflections about teaching, students, and content (Borg, 1999). Beliefs are cognitive conceptions that affect behaviors (Fang, 1996). There is a bidirectional relationship between personal beliefs and behaviors (Mujis & Reynolds, 2002). This is true for teachers' beliefs about cultural diversity too.

Culture

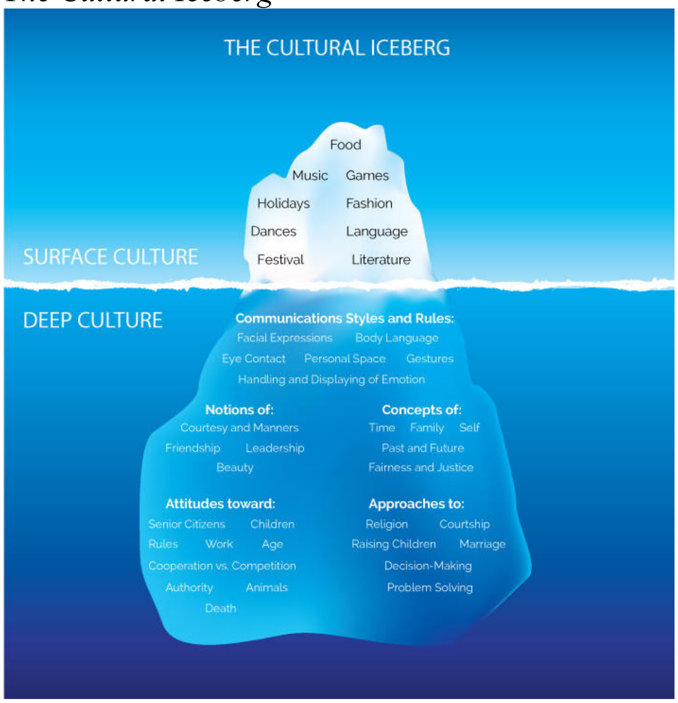
Culture is a cohesive configuration of human behaviors (e.g., beliefs, perceptions, thoughts, communications, languages, practices, values, customs, courtesies, rituals, roles, and behaviors of a racial, ethnic, religious, or social group) that are transmitted over generations.

Cultural features can be found at three levels: surface, sub-surface, and deep culture (Frank, 2013). Most people are often familiar with a particular group's surface culture, which consists of food, national clothing, music, dance, and literature. The sub-surface culture includes unspoken, behavior-based rules of that culture, such as different notions of personal space, body language, eye contact, speech patterns, and facial expressions. For example, in the American culture, while making eye contact with the person you're speaking with is expected, in certain cultures gazing down while talking with especially an adult, is expected of students. These sub-surface level cultural elements become important in having mutual understanding and can eliminate misunderstandings between teachers and students (Frank, 2013).

Deep values and attitudes that we may not be aware of are part of the deep culture, which is the most challenging level for people to conceptualize. The unconscious values of gender roles, the nature of familial and friendship relationships, and the "normal" way of doing this fall under the deep culture. Teachers can become cognizant of why students behave differently from the "norm" within American society by being aware of the deep culture. This awareness can only be attained by building relationships with students and getting to know them deeper. Providing the space for students to think about their own culture and contrast it with others around them would allow them to become cognizant of the similarities and differences and acquire certain cultural norms that they may expect to see in the American society. Allowing students to brainstorm about their own cultures would validate their sense of identity and improve their understanding of belonging (Schachner et al., 2019).

Hall's (1976) iceberg of culture model is helpful when thinking about culture (see Figure 4). When people or schools try to build cultural awareness, they often stick to the "surface" level cultures, but those are outputs of what is below the surface. To know why people think or act the way they do and need to build knowledge on what is below the surface to understand what motivates or angers people. The following image is a powerful reminder of the difference between surface-level culture (the things we can easily see, hear, taste, etc.) versus the hidden or underlying culture (the things we don't know about until we ask, study, explore, learn, etc.).

Figure 4.
The Cultural Iceberg



Hofstede (2001) provides a framework for cultural values and states that culture is collective, not individual; observable in behavior but not visible directly; can be familiar to some but may not be comprehensive to all in a country/region. Culture is defined as the "collective programming of the mind that distinguishes one group or category from another" (Hofstede & McCrae, 2004, p. 58).

Power plays an integral role in every culture, but that role varies based on the culture's stance on hierarchy, authority, and inequality. These inequalities and differences in status and class may exist based on age, gender, "prestige, wealth" (Neuliep, 2015, p. 82), occupation, and societal role. These identities may intersect to increase or decrease authority depending on power distance. Small-power distance cultures value earned power, collective decision-making, interdependence, and role flexibility. Conversely, large-power distance cultures rely heavily on disequilibrium, inequalities, obedience, and strict hierarchical systems.

Where a culture lies on the small versus large power distance scale significantly impacts its stance on education and the role of students within their educational experiences. Cultures with small-power distance academic styles promote "student-oriented" (Neuliep, 2015, p. 82) classroom environments that encourage learning partnerships between students and teachers. Education is a collective process in which students and teachers work together to collaboratively make decisions and interact with content matter and one another. Disciplinary actions stray away from zero-tolerance to align with restorative justice practices more closely. The dynamic between students and teachers is drastically different within the school systems of large-power distance cultures. The student-teacher dynamic relies heavily on obedience. Behaviors within small-power distance cultures may be considered rude or out of line in the context of a large-power distance culture. Teachers, administrators, and their rules are expected to be followed and not challenged; if students act out of line, they may face extreme punishment. Teachers are treated "with respect and honor" (Neuliep, 2015, p. 82).

It is essential to be knowledgeable of culturally and linguistically diverse students' backgrounds so that educators can better understand students' behaviors and individual perspectives on their role in their education. Teachers should not only help their culturally diverse students acclimate to the cultural norms of their new environment, but they should also adapt their approach and teaching style to meet the needs of these students. Understanding the power distance of a student's home or native culture allows educators to better communicate with that student's family system to create a more equitable educational experience. Teachers will be able to accommodate parental or guardian beliefs and communicative norms while engaging them in their student's education in a way that feels most comfortable. Developing a comprehensive understanding of the different cultural archetypes promotes culturally sustainable teaching practices (Kazanjian, 2019).

Culturally Responsive Teaching

Culturally Responsive Teaching (CRT) is defined as "an approach that "empowers students intellectually, socially, emotionally, and politically by using cultural referents to impart knowledge, skills, and attitudes" (Ladson-Billings, 2014, p.20). CRT is a comprehensive construct that includes curriculum, instruction, assessment, and classroom environment (Gay, 2010). CRT addresses the needs of diverse learners. CRT encourages recognizing how culture is impactful in teaching and learning and moving beyond isolated efforts for addressing cultural differences (Ladson-Billings, 2011). According to Ladson-Billings (1994), CRT is a pedagogy that recognizes students' cultural backgrounds during the teaching and learning processes. In the Principles and Standards for School Mathematics (NCTM, 2000), "students who live in poverty, non-native English speakers, students with disabilities, females, and many non-white students are identified to be the victims of low expectations" (p. 13) in mathematics. Consistent with the general frame for CRT in creating a classroom community based on positive relationships, the idea of creating culturally responsive mathematics teaching is focused on sense-making, engaging in reasoning, and sharing that within the classroom community (Aguirre & Zavala, 2013). When students are valued, their engagement in the mathematics classroom improves (Aguirre & Zavala, 2013; Ladson-Billings, 2014). In order to promote equity in mathematics classrooms, teachers should encourage exploration and investigation, use students' prior knowledge, use multiple representations to illustrate mathematical ideas, use real-world problem-solving activities, integrate mathematics with other content areas, use culturally relevant materials as a springboard for mathematics instruction, provide students with opportunities to use technology, encourage oral and written discourse in the classroom, encourage collaborative problem solving, use student thinking to enhance learning, offer an enriched curriculum and challenging activities, and use a variety of problem-solving experiences (D'Ambrosio & Kastberg, 2008, p. 130-141).

CRT is more than teaching strategies as it pushes teachers to examine their beliefs about cultural diversity and use CRT in teaching and learning (Gay, 2010). Beliefs about cultural diversity are multidimensional (Civitillo et al., 2018). One area of research on teachers' beliefs is how teachers incorporate cultural diversity into their teaching and learning within the classroom. As these beliefs are parallel with their actual teaching practices, it is critical to explore these beliefs with the classroom practices. Previous studies examining self-reported measures of beliefs and enacted classroom behaviors showed differences between self-reported beliefs and actual classroom practices. For example, Debnam et al. (2015) found a mismatch between teachers' self-reported cultural responsiveness and their actual teaching behaviors. While teachers assessed themselves as highly culturally responsive, the observational data showed low use of CRT in the classroom. Guerra and Wubbena (2017) noted that teachers who reported the inclusion of students' backgrounds in the school did very little to integrate CRT into their actual teaching practices.

As classrooms become more diverse, the need for CRT becomes even more critical. Hammond (2015) asserts that "for some teachers, CRT is simply an engagement strategy designed to motivate racially, culturally, and linguistically diverse students" (p.3). Establishing and nurturing positive relationships and understanding the level of a student's language skills and content knowledge are vital to planning for all students to fulfill grade-level expectations. Educators also need a deep understanding of pillars of CRT. Instructional decisions in mathematics classrooms are predicated on outcomes by adjusting instruction, providing appropriate scaffolds, and using interactive approaches in a supportive environment. If an educator understands how and when to make these instructional decisions, linguistically diverse students can thrive in student-centered learning environments giving them multiple opportunities to practice, collaborate, and consistently interact with their peers.

In her seminal work CRT, Hammond (2015) stated, "When the tools and strategies of each area are blended together, they create the social, emotional, and cognitive conditions that allow students to more actively engage and take ownership of their learning process" (p. 18). Hammond (2015) writes that teachers can help shift students' mindsets by assisting them to "[rewire] their safety-threat system so that they don't trigger the release of stress hormones every time they try to stretch themselves academically with new challenges" (p. 114). In other words, dependent learners need to be slowly and systematically given opportunities to repattern how they react to and deal with academic challenges. Students need to feel competent as learners based on experience and a sense of agency and control over their environment. Choice helps generate a sense of control, so menu options can be valuable for teachers when developing lesson plans or assessments.

The first section of the framework discusses Awareness. Being aware of the students' backgrounds, home life, challenges, and strengths and weaknesses will help us work more collaboratively in the classroom. As mentioned by Hammond (2015), "Successfully teaching students from culturally and linguistically diverse backgrounds-especially students from historically marginalized groups involves more than just applying specialized teaching techniques" (p. 18). This will help to give the student more comfort and give us more of a connection to be a better partnership. The second section of the framework focused on Learning Partnerships. Partnerships are the keys to success for any student that a teacher feel that s/he is struggling. Culturally responsive teachers take advantage of our brains' wire for connection (Hammond, 2015, p, 19). The third level of the framework consists of Information Processing. In pursuing rigor, we need to remember that the way students are processing the information is changing at a fast pace. What happens when we struggle to find the proper method to help with processing? Hammond (2015) noted, "This practice area outlines the process, strategies, tactics, and tools for engaging students in high-leverage social and instructional activities that over time build higher-order thinking skills" (p. 19). It is important to remember that there is a pyramid of information to build on to reach the highest level of productivity. The last area the framework discusses is Community Building. This helps students feel a sense of safety and security to know that their questions will be answered.

To build relationships with teachers and students who are culturally different, there needs to be an establishment of rapport with students based on respect through a learning partnership. According to Hammond (2015), "a relationship is anchored in affirmation, mutual respect, and validation that breeds an unshakable belief that marginalized students not only can but will improve their school environment" (p. 74). This can be achieved when teachers and students are able to develop a connection where both teacher and student work together to address the learning needs the student has. Teachers should recognize how their stereotypes can affect a particular situation with a specific student. Parker et al. (2017) stated that CRT is a vital construct to address students' needs, but it is not easy to convince teachers to believe in the power of CRT in mathematics education. The results of Parker et al.' s (2017) study showed that some teachers expanded their awareness and dispositions for cultural responsiveness to better support their students' learning as culturally responsive teachers.

When teaching mathematics to all students, it is important to keep in mind that that everyone can learn. According to Ellis (2019), students succeed in mathematics with the support of their opportunities, not due to genetic disposition (intelligence). Teaching mathematics within the CRT framework helps students improve their mathematical skills because students' reasoning and identities have been found to be correlated with access to equitable resources and support in the mathematics classroom (Boaler & Staples, 2008; Gutiérrez, 2013; Kisker et al., 2012; NCTM, 2014). Ellis (2019) outlines that culturally responsive mathematics teaching consists of four elements: "Supporting deep learning, engaging and valuing identities, sharing authority, applying mathematics" (p. 5). The aspects of culturally responsive mathematics teaching call for creating a welcoming environment where the students are valued for who they are, mutual and transparent communication is present, and a community of learners has been developed through contact. The intersection of TC and CRT frameworks allowed capturing teachers' beliefs, perceptions, experiences, and strategies about MLs and the self-reported measure of their own cultural responsiveness. Therefore, my dissertation study is very timely in addressing the move toward an equity focus on mathematics education regarding teaching MLs in 6th and 12th grade mathematics classrooms.

Cultural Awareness and Cultural Competency

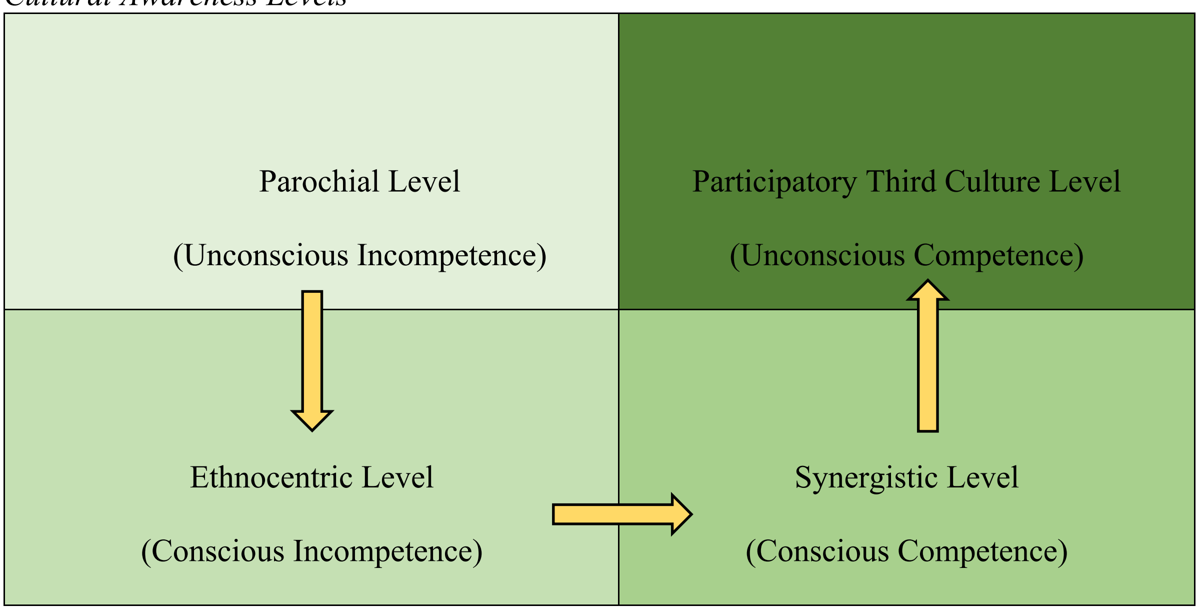
By addressing the awareness within the CRT context, I believe that understanding cultural competence is critical because as teachers increase their awareness of different cultures, they will be more competent. Cultural competence is the ability to understand and respect other cultural traditions, customs, and values (Ellis-Robinson et al., 2019). Although many teachers spend the effort to provide effective instruction for their students, they may not often reflect the diversity of the students because of their lack of cultural competence. Thus, the education of teachers who lack cultural competence may not respond their students' needs. Cultural competence is a critical element of culturally responsive teaching. It requires teachers to comprehend the role of culture in education, the value of learning about beliefs and values in different cultures, and the urgency of gaining insights into difficulties facing diverse students. For cultural competence, required teaching practices are: (1) that teachers are empathetic and caring; (2) that they are reflective of their beliefs about people from other cultures; (3) that they are reflective of their cultural frames of reference; and (4) that they are knowledgeable about other cultures (Rychly & Graves, 2012).

Teachers' cultural competence through these four practices is the core of their culturally responsive teaching in the mathematics classroom. Teachers who were more emphatic, caring, reflective about their cultural values, and knowledgeable about other cultures than others had effective culturally responsive teaching in their mathematics classes. It has been found that culturally responsive teaching is positively correlated with teachers' emphatic and caring behaviors (Irvine, 2003; Averill et al., 2006). Caring and emphatic teachers may not tolerate underachievement (Irvine, 2003). These teachers insist on holding diverse students to the same standards as other students, understand students from the students' perspectives, and are more reflective of their beliefs about diverse students and their actions when teaching (McAllister & Irvine, 2002). That is directly relevant to these four practices, which are core for culturally responsive teaching and required for teachers' cultural competence (Rychly & Graves, 2012). To be responsive to others, teachers should investigate their own beliefs and perceptions about other cultures because they may grow up in racist communities and inherently develop or internalize similar stereotypes about different cultural groups within their communities (Grant& Asimeng-Boahene, 2006; Nieto, 2004).

Unless teachers explore their own beliefs about their MLs, they inherently may think that an ML does not have language skills, is a cultural or linguistic deficit, or an ML has to be assimilated to the new cultural norms ((Nieto, 2004; Quaye & Harper, 2007; Rychly & Graves, 2012). Also, teachers' worldviews can impact their classroom practices (Rychly & Graves, 2012). For example, it is also harmful to have cultural blindness by ignoring the cultural differences and making diverse groups of students invisible. That can cause unintended harm to a diverse group of students. Unless teachers reflect on their own beliefs and perceptions about different cultures and uncover their worldviews, they can damage their students' engagement, motivation, and belongingness. These challenges can impact students' well-being and, more specifically, their' success and retention (Kursav et al., 2022). Considering these inherently developed beliefs and perceptions, teachers should take action to be more knowledgeable about other cultures involving the language (not only about the words but also the ways the language is used) to provide them with a more culturally responsive teaching repertoire. In some cultures, when communicating, the norms of some languages require being more active, engaging, and participatory, whereas others require the speakers to take turns (Irvine 2003). Thus, the use of a language can influence student-teacher communication.

Similarly, learning happens individually in some cultures, whereas acquiring knowledge is more collaborative in other cultures. Knowing the culture can help teachers figure out the communication and learning styles of the diverse group of students in the classroom. These are not easy to adjust and develop quickly. Teachers should learn to balance that while students are members of cultural groups with different practices, they are also individuals. Teachers also should recognize that stereotyping diverse groups of students have similar negative results to ignoring them (Rychly & Graves, 2012). The beliefs and perceptions can be developed consciously or unconsciously (Nieto, 2004). Thus, teachers can consciously or unconsciously be competent or not competent of other cultures. This idea stems from the four levels of Cultural Awareness. In the literature on cultural awareness, these levels are called unconsciously incompetent, unconsciously component, consciously incompetent, and consciously competent. However, in my dissertation study, instead of using these names for the four levels, I use the following terms (since they were more descriptive and not critical): Parochial, Ethnocentric, Synergistic, and Participatory third culture (see Figure 5).

Figure 5.
Cultural Awareness Levels



The parochial level is about being a member of a dominant culture without being aware of any other cultures; the Ethnocentric group is about being aware of different cultures by believing firmly that their own culture is superior and resisting to make changes in their behaviors; the Synergistic level is about valuing cultural differences by understanding their own biases and adopting new ways of doing things, and Participatory third culture level is about understanding the cultural behaviors of others and by working together creating a shared culture.

In summary, the parochialism level occurs when people feel that they are members of a dominant culture without being aware of other cultures. Ethnocentrism makes people attach tightly to their community and feel “proud of their heritages by subjectively using their cultural standards as criteria for interpretations and judgments in intercultural communication” (Chen & Starosta, 2005, p. 27). Ethnocentrism causes one to judge other groups (Graen & Wakabayashi, 1994) and negatively impact people's engagement with different cultures. Cultural awareness is the major component of cultural competence, and they are both required core pieces of CRT. Cultural competence within CRT consists of using critical thinking skills to acknowledge conscious and unconscious behaviors, recognizing the perpetuation of inequity through socialized behaviors, and maintaining a commitment to disrupting inequitable practices for the greater good (Clark, Zygmunt, & Howard, 2016). These are all required components of CRT practices. Mayfield (2020) shared an example in her book that

> As a young mother, I was eating an ice cream cone with my sons when I bit down to the bottom of the cone and threw it away. “Why did you do that?” J.R. asked me. “Do what?” I retorted. “Throw the bottom of your cone away, Mom. Why do you do that?” I paused for a moment and had to think about it. As a child, my aunt had worked at an ice cream cone factory in the 1950s and would never eat the bottom of the cone. She swore it to be unsanitary. We were never allowed to do so either. Twenty years later, my lips had never touched the bottom of a cone, and I was operating on autopilot. (p. 16)

She also added the following sentence to the example included in the book:

> Don't laugh too hard. There are things you have done without thinking about them, too. There are beliefs you hold that influence your decisions—some of them made on autopilot. If you can understand how the messages you receive, both verbal and nonverbal, influence the things you do, you can comprehend the importance of culture in teaching and learning (p.17).

Cultural competency stimulates individuals to scrutinize their cultural values and think about understanding their students' cultural values and beliefs. This, in turn, encourages them to become proactive in disrupting practices and behaviors that perpetuate inequity. Culturally competent educators are willing to disrupt inequitable systems and break down barriers to provide opportunities for underserved populations. Becoming culturally competent allows teachers to employ CRT strategies confidently and productively (Mayfield, 2020). If teachers do not have cultural competency, they might not have a repertoire of possible actions to take in teaching mathematics, empathy, experience, and training (Mayfield, 2020; Quappe & Cantatore, 2005).

CHAPTER 4: METHOD

This chapter presents my research questions, design, and rationale for using mixed methods, including my analytic frameworks. Then my participants, research site, data collection methods, and sources are introduced. Finally, I discuss soundness criteria, ethical considerations, my timeline, and methodological limitations and implications.

The research questions are:

- What are the beliefs and perceptions of mathematics teachers in engaging MLs in 6th-12th grade mathematics classrooms?
    - How do these teachers' beliefs and perceptions differ with respect to gender, training, educational level, years of experience, race, level of education, and language assistance?
- What are mathematics teachers' experiences engaging MLs in 6th-12th grade mathematics classrooms?
    - How do teachers' experiences differ with respect to gender, training, educational level, year of experience, race, level of education, and language assistance?
- What strategies do mathematics teachers use to engage MLs in 6th-12th grade classrooms?
    - How do these teachers' strategies differ with respect to gender, training, educational level, years of experience, race, level of education, and language assistance?

Using the TC and CRT theoretical frameworks, I used a mixed-method design to investigate these research questions. The use of TC and CRT helped me understand teachers' beliefs, perceptions, experiences, and strategies of MLs.

Mixed Methods Study Design

A sequential mixed method design was utilized in this research. The mixed-method nature of this study provided an in-depth understanding of the beliefs, perceptions, experiences, and strategies of mathematics teachers in a middle school classroom in the United States. With the mixed methods research, I combined “the elements of qualitative and quantitative research approaches (e.g., use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the purposes of breadth and depth of understanding and corroboration” (Johnson et al., 2007, p. 123).

Qualitative research methodologies have become increasingly important “modes of inquiry for social sciences and applied fields” (Marshall & Rossman, 2014, p. 1), and they are used to understand the meanings created by the participants in an activity or context (Wolcott, 2009). More specifically, Creswell (2008) defined qualitative research as “an inquiry process of understanding based on distinct methodological traditions of inquiry that explore a social or human problem. The researcher builds a complex, holistic picture, analyzes words, reports detailed informants' views, and conducts the study in a natural setting” (p. 15). It is suggested that qualitative research methodologies are preferable for studies seeking to understand people's experiences. The interviews provided me with qualitative data sources.

Quantitative methods are used to examine the relationship between variables, with the primary goal being to analyze and represent relationships mathematically through statistical analysis. I conducted surveys with the teachers to understand their perceptions and beliefs about teaching MLs. Using a mixed method approach combines the strengths of qualitative and quantitative research where the strengths of one helps to address the weaknesses of the other. Mixed methods research provides more evidence when studying a research problem than quantitative or qualitative research alone. Researchers can use all of the available data collection tools rather than being restricted to the types of data collection typically associated with quantitative analysis or qualitative research. The sequential mixed methodology allowed me to collect multiple types of data sequentially.

Mixed methods provide “multiple ways of seeing and hearing” (Greene, 2007, p. 20). Mixed methods research offers a natural outlet for various ways of research. Mixed methods research has strengths and weaknesses as it includes both quantitative and qualitative approaches to research. One reason is that quantitative analysis alone does not provide an in-depth understanding of the participants’ settings. Also, the participants' voices are not heard in quantitative research alone. Qualitative research makes up for these weaknesses. The self-reported measures used in quantitative methods are validated and supported by qualitative interviews and observations. According to Greene (2007), mixed methods conceptualized this form of inquiry differently as a way of looking at the:

> social world that actively invites [us] to participate in the dialogue . . . multiple ways of seeing and hearing, various forms of making sense of the social world, and various standpoints on what is essential and to be valued and cherished. (p. 20).

Mixed methods provided multiple ways of seeing (Creswell & McCoy, 2011). There were two phases in data collection (see Table 1). In phase 1, I collected data using a survey adapted from those developed by Karabenick and Noda (2005) and Rhodes (2017). By considering items from both surveys, I investigated teachers' beliefs and perceptions about their mathematics teaching. I was able to have a better sense of (as reported by teachers) (a) whether or not teachers’ mathematics class materials are culturally responsive; (b) how they are making their courses culturally responsive, and how they are getting to know their students and their cultural values, traditions, and families; (c) how they are promoting their students to be engaged and learn; (d) what teachers are thinking/believing about the potential solutions to make the mathematics class more relevant to students and engage them in mathematics; (e) how they are designing the task and classroom activities; and (f) what they are thinking about the cultural responsiveness aspect of curriculum which they use in their mathematics instruction, and how they are assessing students (see Apendix 1). While I am investigating teachers' own beliefs and perceptions, they can also better understand what they think and believe when teaching MLs or the potential points they should consider in their future teaching. After collecting the survey data, I used a subset of the 6th to 12th grade mathematics teacher participants from the surveys for the second phase.

In phase 2, more specifically, for the qualitative interviews, I showed an example for each level of cultural awareness that helped me interpret data coming from teachers and present their beliefs, perceptions, experiences, and strategies. It also helped me better organize participants' thinking and understanding. Each example helped me create a complete picture of the more remarkable story. Also, each example for each level included discussion probes about the issue and character.

Table 1.
Data collection phases

Phase	Data Collection	Recruitment
Phase 1	An adapted survey that involves Karabenick & Noda (2005) and Rhodes (2017) survey questions	Reached out via email to district superintendents, mathematics coaches; mathematics teachers' listservs, and connecting with mathematics teachers' social media groups Sent out the adapted survey via a Google form to interested 6th to 12th grades mathematics teachers (n=190) Teachers checked the responses to the item asking if the participants are volunteering to join the interview or not

Table 1 (cont'd)

Phase 2	Teacher Interviews	Reached out to the volunteer teachers to check if they were still interested in joining the second phase (n= 62). Scheduled time with teachers who provided their consent forms (n=15) Met with teachers on the zoom and recorded their interviews

Participants

My participants were the 190 mathematics teachers, 6th through 12th grade, who completed my survey. I reached out to at least 1000 teachers (through the process of the application with districts, individual schools, teacher social media groups, teachers' listservs) which results in an estimated response rate of 19%. The survey was shared on professional teacher sites and through school districts. In order to identify participants for the second phase, at the end of the survey, I asked teachers if they were willing to volunteer to participate in an interview. I emailed all teachers who volunteered on the survey to participate in the interviews and sent the consent forms for qualitative data collection (i.e., interview). After receiving the consent forms, I scheduled interview times with the participating teachers using the whenisgood online scheduling application. I interviewed 15 teachers and only included 14 of them in my analysis. I excluded one interview with some technological glitches, as the audio quality was not good.

Data Collection: Phase 1

Survey

Survey research is defined as "a method of descriptive research used for collecting primary data based on verbal or written communication with a representative sample of individuals or respondents from the target population" (Mathiyazhagan & Nandan, 2010, p. 34). First, a survey was adapted and utilized with the participating teachers in the study. I drew a road map for implementing the survey in the next part.

I adapted surveys (which involved items for teachers' beliefs, perceptions, experiences, and strategies that allowed teachers to make a self-reported measure of their cultural responsiveness) for TC and CRT considering 6th and 12th grade mathematics teachers. The first questionnaire that I used was adapted from a pre-existing survey created by Dr. Stuart Karabenick from the University of Michigan School of Education and Dr. Phyllis Noda from Eastern Michigan University. I received permission from them to adapt the survey to understand educator experiences and opinions of MLs better and develop appropriate support for mathematics teachers. Additionally, question items regarding TC in working with MLs were added to the adapted survey. The adapted survey involved three sections: (1) Demographic Information section (13 items), (2) Your Experience with MLs section (99 items), and (3) Culturally Responsive Teaching section (17 items). At the end of the survey, an item asked participants if they would consent to participate in the interviews and provide their email addresses to connect them.

The first questionnaire was adapted from a pre-existing survey created by Karabenick and Noda (2005). Their survey is a 5-point Likert scale survey; there are 78 items within 14 conceptual areas: Teacher efficacy: general and ESL, Approaches to teaching: mastery versus performance, Second language learning, Relationship between language and academic skills, Bilingual, bicultural education, Assessment of MLs, MLs and collaborative instructional approaches, MLs and classroom resources and time on instructional tasks, Interactions between ML and non-ML students at the school, Teacher beliefs about MLs' parents, School climate for

MLs, Teacher attitudes toward MLs, General sociocultural attitudes, and Bilingual resources. (Karabenick & Noda, 2005, p.58)

There was also an open-ended portion for teachers who needed to add more comments. The demographic section of the Karabenick and Noda (2005) survey was beneficial for recording variables such as the teacher's native language, race or ethnicity, and years of teaching experience, which was used to explore the relationships between those demographic variables and teachers' culturally responsive teaching practices and beliefs.

Karabenick and Noda (2005) created the survey and conducted a study using the data that came from 150 teachers. The survey identified items involving the categories of teachers' knowledge, attitudes, beliefs, and behaviors that impact their delivery of quality educational services to MLs in the classroom. I used the version which Hos (2020) adapted and added the "mathematics" as content to the items. Hos was the ML Ambassador of RIDE and adapted Karabenick and Noda's (2005) survey to better understand educators' experiences with and opinions of MLs and develop appropriate support for educators. When preparing the study, Karabenick & Noda (2005) used:

> The exploratory factor analysis and estimates of internal consistency (Cronbach's α) were used to derive scales (described subsequently), which were constructed by averaging the responses to individual items (i.e., unit weighting) that had salient (i.e., > .5) factor loadings.
>
> Things were reverse coded where appropriate so that higher values represent more agreement and minor disagreement. In general, mean scale values close to 3.0 indicate that most responses were in the neither agree nor disagree range or similar proportions of

> 'agree and disagree.' Values greater or less than 3.0 suggest more or less aggregate agreement, respectively. (p.59)

Karabenick and Noda (2005) researched the beliefs and perceptions of teachers about MLs and teachers' beliefs about their teaching to meet the needs of MLs. They reported that teachers did not have foundational knowledge about MLs.

Another questionnaire that I used for my study was adapted from a pre-existing survey created by Dr. Christy M. Rhodes from the College of Education at East Carolina University in 2016. The CRT survey included teaching practices about which 6th and 12th grade mathematics teachers reported on the frequency of use and desired frequency of service using a 5-point Likert scale (i.e., with levels: never, rarely, sometimes, usually, and always). For reliability, Rhodes reported the Cronbach Alpha Coefficient of the scores "from the frequency and desired frequency sub-scales demonstrated good levels of internal consistency, ranging from .781 to .880. Thus, there is evidence that the CRT survey yields consistent and reliable results" (p.219). In Rhodes' survey, exploratory factor analysis was used to investigate survey structure.

The EFA produced a five-factor solution using a varimax rotation and was used for the final solution. The factor pattern coefficients revealed a majority of the 17 items with factor loadings of .55 or greater, thus deemed significant indicators of their respective factors. (p.217)

Rhodes's (2017) survey involved demographic questions and the cultural and linguistic profile of the teaching environment. Rhodes's survey allowed teachers to evaluate particular teaching practices relevant to their classroom. Additionally, Karabenick and Noda's survey allowed me to understand better educators' beliefs, perceptions, experiences, and opinions of MLs. Since I am interested in investigating teachers' beliefs and perceptions and their experiences (teacher cognition) and teaching practices (as it pertains to culturally responsive teaching), both questionnaires were ideal for my adapted survey. The new adapted survey was developed, expert advice was taken, and I made revisions according to expert suggestions (see Appendix 4).

Data Collection: Phase 2

In the second phase of the data collection, I collected the data from teachers' interviews.

Teacher Interviews

I conducted interviews with the teachers. Having the interviews allowed me to integrate my and the teachers' perspectives on their experiences in class. The interviews were structured as questions. The interview protocol was developed and is available in the IRB (see Appendix 1), considering the categories of items in the Sheltered Instruction Observation Protocol (SIOP). The SIOP observation protocol is a research-based instructional model used in teaching the MLs. For my interview questions preparation, SIOP is an effective protocol for addressing the academic needs of MLs. It is a framework for teachers when they design their content comprehensible instructions to ensure that MLs meet their content and language needs in class. SIOP was developed by Echevarria et al. (2008). The different categories of the protocol are: (1) Lesson Preparation, (2) Building Background, (3) Comprehensible Input, (4) Strategies, (5) Interaction, (6) Practice and Application, (7) Lesson Delivery, (8) Review and Assessment. Using categories of SIOP, I asked teachers whether they included content objectives, language objectives, content concepts, supplementary materials, an adaptation of content, meaningful activities that integrate their lesson concepts, and how they had these components in their mathematics classrooms. I also investigated if they could link the concepts to students' background, link the prior learning to new concepts, clearly emphasize and use concept keywords using an appropriate speech for students' proficiency levels, and provide a clear explanation using various techniques. With the SIOP categories in mind, I explored if teachers provided opportunities to use learning strategies, supported students learning using scaffolding techniques, and provided the appropriate activities and tasks to improve their higher-order thinking skills. I investigated teachers' interaction with their students based on their perceptions and if they offered necessary wait time, appropriate pacing for instruction, tools, and manipulatives for MLs. SIOP categories helped me organize my interview questions and have been helpful in understanding if teachers supported their education with content and language objectives, supported their students' engagement, and provided them with comprehensive assessments of the concepts. The interview sessions were recorded, which allowed me to capture complex interactions such as gestures, facial expressions, and non-verbal cues (Marshall & Rossman, 2006; Miller & Zhou, 2007). Recordings also allowed me as a researcher to view the recordings repeatedly during analysis (Lemke, 2007). I had "little to no interaction with those being studied" (Glesne, 2011, p. 64).

Data Organization and Preparation

In this section, the organization and preparation of data are discussed. The organization and practice of the data included how the data were tracked, stored, and transcribed. Mixed methods studies generate a large amount of data, so the data needs to be organized before and during the analysis stage. The responses were stored in google forms and ranked as the teachers who responded to the surveys. The interviews were captured on audio and video recordings and entered into a log. The video recording for the interviews was necessary to capture the non-verbal cues that the participants displayed. For recordings, I indexed each recording to enable transcription. There was also a log of each interview with notes taken during the interview.

Criteria of Soundness

For research to be trusted, there needs to be criteria for quality (Lincoln & Guba, 2000; Marshall & Rossman, 2006). Lincoln and Guba (1985) refer to these criteria as "truth value" (p. 290). Four constructs make up these criteria: credibility, transferability, dependability, and confirmability (Marshall & Rossman, 2006), which I discuss in the following sections.

Credibility within a qualitative study is demonstrated when the researcher "explores a problem or describes a setting, process, social group, or pattern of interaction" with in-depth and clear identification (Marshall & Rossman, p. 201). Credibility was attested by including data from multiple sources. Credibility was addressed by triangulation. Triangulation involved carefully reviewing and comparing data collected from multiple sources to examine a phenomenon.

The different forms of triangulation are data triangulation, which is done by using other data sources; methodological triangulation, which is done by comparing different methods in the study; investigator triangulation, which is done by including multiple investigators in the study; and theory triangulation, which is addressed by having various theoretical frameworks to study a phenomenon (Stake, 1995). Although there may be threats to credibility in observer bias and observer effects in the observation and interview processes, this is addressed by triangulating the data sources (Gay et al., 2006). The combination of data from different sources through triangulation was employed to check the accuracy of findings in this study. Data triangulation, methodological triangulation, and theoretical triangulation were embedded within the study design. Investigator triangulation was addressed by having my advisor, Dr. Drake, and my committee members provide feedback during data analysis sessions and respond to drafts of my research. Investigator triangulation was addressed by having the participating teachers provide feedback on the data findings. Two volunteer teachers reviewed a summary of the data analysis and an overview of the study's final results to address member checking.

Transferability is demonstrated when researchers "argue that findings will be useful to others in similar situations, with similar research questions or questions of practice" (Marshall & Rossman, 2006, p. 201). Marshall & Rossman (2006) recommend "triangulation of multiple sources of data" to demonstrate the transferability of the research (p. 201). Confirmability in a study refers to the internal consistency of the data in relation to the findings, interpretations, and recommendations. To attend to confirmability, researchers need to make "sure that the findings reflect the participants and the inquiry itself rather than a fabrication from the researcher's biases or prejudices" (Marshall & Rossman, 2006, p. 201). To address confirmability, I situated the study in the research literature.

Ethical Considerations

All of Michigan State University's (MSU)'s Institutional Review Board (IRB) ethical guidelines were followed. Critical concerns were considered to ensure the protection of the participants. The first step in addressing potential risks was to ensure the confidentiality of all the participants. In order to protect the participants' privacy, I took caution when recording the data and constructing documents from the data. The data was recorded with zoom; digital files were saved on my personal portable computer that only I have access to, and backup files were saved on an external hard drive. The data was transcribed using pseudonyms for the participants and the locations and analyzed on my computer. The data within my personal computer was password-protected, and the computer was locked up when not in use. All participants were aware that I was careful to protect their confidentiality and privacy. As is customary, they were also offered the opportunity to withdraw from the study without prejudice.

The following ethical consideration was my position as a researcher. The ethical considerations that I identified as arising from this would be forming a rapport with teachers as a researcher; thus, teachers may feel threatened and subject to criticism. To address these concerns, I explained my role as a researcher to obtain consent from teachers. The informed consent process was completed before the data collection began. The consent forms emphasized that participation in this study was voluntary and that participants could withdraw from the study without consequences.

The final ethical consideration in this study was reciprocity. Marshall and Rossman (2006) remind us that "qualitative studies intrude into settings as people adjust to the researcher's presence"; therefore, the researcher should "reciprocate" (p. 81) or give something back to participants. As a way of reciprocating, I assisted the teacher as feasible within the interview process. The participating teacher gave their time, experiences, life stories, and insights throughout the study.

Positionality Statement

My love of learning began in childhood. My parents, both teachers, were my role models, instilling a lifelong enthusiasm for learning and understanding of the value of education. As I got older, I became intrigued by mathematics education. My passion for knowledge led me to earn a B.S. degree in Elementary Mathematics Education. I have always had a passion for being a woman in the mathematics field, and my commitment to 6th through 12th grades is in part by my own experience because of my parents' inspiring love of teaching in 6th through 12th grades. Now, I am a Ph.D. student in Mathematics Education and working on the Connected Mathematics Project. I earned my M.A. in Mathematics Education as a Fulbright Scholar. Thus, I see myself as a cultural ambassador and believe that this opportunity has provided me to foster my leadership skills, learning, and empathy between cultures. In my research, I examine the beliefs, perceptions, experiences, and strategies of mathematics teachers in engaging Multilingual Learners (MLs) in 6th through 12th grades mathematics classrooms to understand how mathematics teachers perceive their roles in the teaching of MLs.

I believe that the needs and engagement of MLs have not been fully met and are often overlooked in the field of mathematics. Many MLs are invisible and have been grappling against prejudice, inequity, racism, and discrimination. As educators, we cannot overlook that race, culture, class, gender, ability, language, sexual orientation, religion, and socioeconomic status are important factors contributing to people's success in the American education system. Overall, since "teaching is values-based" and "there is no way around the fact that teaching is not a neutral act" (Budge & Parrett, 2018, p.17), teachers must look closely at how issues of poverty, social class, archetypes, language register, and trauma affect students in a multitude of ways daily within the context of our classrooms and schools. There is so much more than just academic achievement to be concerned about with our learners.

Being an educator of mathematics teaching is a high honor. I am not only contributing to who my students (future teacher educators) become as individuals, but I have a powerful opportunity to guide them in embracing the diverse world. I have seen first-hand, and research supports that children are not born with the want to judge others based on their differences. They do not inherently believe that color, language, gender, socioeconomics, etc., make one group inferior to another. Children notice the visual variations among us, but it is not until they learn from others that they begin to understand the judgments and biases dwelling in our society (Noel, 2018, p. 56). Our responsibility is to make every student feel and believe that they are valued, important, supported, and accepted in our society. We have the power to showcase and embrace our cultural differences so that our students do not look to their neighbors as a problem but rather as a partner.

Where do we begin? How do we attack the centuries-old structural and systemic racism that exists? We start by examining ourselves. By knowing who we are, acknowledging our own beliefs and actions, and admitting the existence of inequities and injustices, we can do our part to make a change. Noel explains, “People have an instinctive fear and dislike of physically and culturally different individuals from Ourselves” (Noel, 2018, p. 55). It is not easy to make ourselves vulnerable to the honest truth of who we are. Doing so opens us up to seeing our faults and our strengths. However, I am glad I am hoping to become a catalyst for change in the teaching and learning of mathematics.

Analysis

I have two phases of analysis: quantitative and qualitative. Please see Table 2, which shows each source's data sources and analysis plans.

Table 2.
Data sources and analysis

Bigger Research Questions	Data Sources	Data Analysis
What are the beliefs and perceptions of mathematics teachers in engaging MLs in 6th and 12th grade mathematics classrooms?	An adapted survey that involves Karabenick & Noda (2005) and Rhodes (2017) survey questions.	Use IBM SPSS Statistics Version 28 (IBM SPSS, 2022) Use of Google forms for the survey was sent out to teachers Analysis using descriptive statistics and other appropriate statistics methods

Table 2 (cont'd)

What are mathematics teachers' experiences engaging MLs in 6th and 12th grade mathematics classrooms?	An adapted survey that involves Karabenick & Noda (2005) and Rhodes (2017) survey questions. Teacher Interviews	Use of both quantitative and qualitative methods to analyze the data Use of the codes and the coding scheme for the data analysis Use of IBM SPSS Statistics Version 28 (IBM SPSS, 2022) for data analysis
What strategies do mathematics teachers use to engage MLs in 6th and 12th grade classrooms?	Teacher Interviews	Use of qualitative methods to analyze the data Use of the codes and the coding scheme for the data analysis
What are the differences in teachers' beliefs, perceptions, experiences, and strategies with respect to gender, training, educational level, year of experience, race, level of education, and/or language assistance?	Teacher Interviews Focused prompt: The open-ended question in the interview is Based on our conversation with you: Please explain what you were thinking. Why do you have the specific teacher move? How does this example reflect your beliefs or prior experiences with MLs?	Use of qualitative methods to analyze the data Use of the codes and the coding scheme for the data analysis

Quantitative Analysis

I used IBM SPSS Statistics Version 28 (IBM SPSS, 2022), Mplus (2022), Stata (2022), and Excel for my quantitative data analysis. Google forms for the survey were sent out to teachers. Then I analyzed using descriptive statistics, factor analysis, and regression. Factor analysis helped understand whether and to what extent items from the survey may reflect an underlying factor. There are two significant types of factor analysis Exploratory factor analysis (EFA) and Confirmatory factor analysis (CFA). I first ran Exploratory Factor Analysis (EFA) for the adapted survey of Karabenick and Noda (2004) since they did not share the factor structure in their publications. EFA helped me to discover several factors. Later, I chose items that loaded highly on one aspect and low on other factors to obtain the simplest factor structure. I conducted extraction step by step and rotation (more information is shared in the findings section).

As an initial analysis, I applied the principal components analysis (PCA) which is the default method of EFA, to decide the number of factors (Raykov & Calvocoressi, 2021). Within PCA, the measurement of error is not calculated. It is not a proper factor analysis. Instead, PCA helped me to figure out the number of factors. I used the usual rule of greater than one, the Kaiser-Gutman rule. Later, I also looked at the scree plot to determine the most significant drop in eigenvalues that might be accepted more efficiently to decide the number of factors (Cattell & Vogelmann, 1977). I also utilized the extraction method to estimate the loadings in this process. I performed the extraction using the principal axis factoring. Later, I used factor rotation, a scaling approach for the loading, to decide if the factors were oblique or orthogonal. It is the fact that the orthogonal process provides a stronger assumption that the factors are uncorrelated; however, this is not likely in most applications.

Then for both adapted surveys: Karabenick and Noda (2004) and Rhodes (2017), I applied CFA. CFA helped me explore how well the factor structure fits with the data. It is crucial to know that the model fit test allows a non-significant result that fits the data well. Also, the model fit originated from the correlation comparison among the items to the correlations expected by the model being tested. The fit indices I was interested in during my analysis are

Chi-square (χ^2lower values indicate better fit), RMSEA (lower values indicate better fit (< .06)), SRMR (lower values indicate better fit (< .08)), Comparative Fit Index (higher value indicate better fit (>.95)), and Tucker-Lewis Index (higher value indicate better fit (>.95)). Until I found the best fit model, I altered and retested the model. More details for the quantitative analysis were provided in the findings section step by step.

Then, the multiple regression analysis conducted in this research was based on independent variables, [which are denoted as $x_1, x_2,..., x_k$ (with k>1) and dependent variables [which are denoted as y.]. As stated in the Raykov and Marcoulides (2012) textbook, on the one hand, the independent variables are denoted as predictors: $x_1, x_2,..., x_k$ can have any scale and distribution. On the other hand, the dependent variables are referred to as response or outcome variables assumed to be continuous. The weights are $\beta_1, \beta_2,...,$ and β_k, and the linear combination of the predictors

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + ... + \beta_k x_k + \varepsilon$$

The equation represents the "predicted-by-the-model response score, the correlation between model predictions and observed outcome scores" (Raykov & Marcoulides, 2012, p. 240), and **ε** is the model error that is called residual and "assumed normal when we want to carry out statistical inference, with a mean of zero, and uncorrelated with any of the explanatory variables" (Raykov & Marcoulides, 2012, p. 240).

The variable selection process is critical, and there are different approaches to do that. The predictors can be chosen based on empirical inclusion and/or exclusion criteria such that forward, backward, or stepwise regression (Darlington & Hayes, 2017). Running a regression analysis with many variables might lead to a needlessly complex model. In order to deal with this matter, I used the stepwise regression method, which is a way of selecting some of the variables to get a better interpretable model. The stepwise selection method for regression analysis increases generalizability and accuracy (Darlington & Hayes, 2017). According to Raykov and Marcoulides (2012), "a stepwise selection approach can be recommended whenever a researcher is interested in predicting a response variable using variables from a given initial set, and he or she wishes to accomplish this with the most parsimonious, plausible model possible for the analyzed data" (p. 263). Via the stepwise technique, the predictive variables can be carried automatically. The predictive variable is included for addition to or subtraction during the automatic process from the explanatory variables (Desboulets, 2018; Johnson, 1992). In the stepwise regression, predictors entered at earlier steps that become non-significant later can be removed from the model. Also, when none of the predictors in earlier steps become non-significant later, the results of the stepwise regression can look the same as the forward regression (Desboulets, 2018).

Qualitative Analysis

My qualitative data analysis was guided by emergent coding. Because my research questions are broad and exploratory, emergent coding was most appropriate (Blair, 2015). First, I read through the interviews, broke up teachers' responses into discrete pieces, interpreted each piece, and decided on categories and subcategories. Thus, in my coding process, I first used a coding strategy that allowed me to stay close to participants' intent and meaning without adding my interpretation as a researcher. In the first step of my coding, this method helped me summarize the teachers' responses to each question into short phrases extracted from the interview itself. I called the first code as an indicator. After my first-round pass at the coding of interviews, I grouped the indicators into categories within each category if they were similar or identical. I searched for the commonalities between two pieces of data related to the same subject. I aggregated and condensed my codes into broader categories. Then I iterated on these categories and moved the codes around until I found a structure that made sense for the analysis.

Finally, I checked the coding to see if I got an overarching theme or takeaway. After a thorough emergent coding, I made sense of the relationships between the themes that emerged from the data (see Table 3). In order to check Item rater reliability (IRR), another researcher (who has a PhD, in mathematics education and more than 10 years mathematics teaching experiences in high school and colleges and who is an expert in qualitative analysis in mathematics education) was included and two coders coded the items of interviews (that came from 14 teachers) separately to check if the codes of the interview data are working and then these two coders were compared considering the overarching categories. The IRR results showed that the kappa (κ) coefficient for rater 1 and rater 2 is 0.90 at the level of the codes, .94 at the level of each category. As a rule of thumb, κ values above 0.80 outstanding (Landis & Koch, 1977). Most statisticians prefer values to be at least 0.6 and most often higher than 0.7 before claiming a good level of agreement. Thus, there is perfect agreement.

In the interviews, I asked 15 questions to 14 mathematics teachers: (1) What is your experience in teaching MLs?, (2) What are the components of effective instruction for MLs?, (3) In your teaching, what is your approach for preparing your lesson considering MLs? (Content and language objectives), (4) How do you engage, involve, and communicate with MLs in your math classroom?, (5) How do you modify your mathematics curriculum, lessons, activities, and assessments to make these accessible for MLs? What strategies do you use?, (6) In your teaching, how do/would you build the background of the mathematical content for MLs?, (7) What are your strategies to support MLs' understanding of the essence of what is being presented or said to them? If you do not have any idea, do you use modeling gestures, etc.? How frequently do you use these strategies?, (8) What are your scaffolding strategies for MLs? How frequently do you use scaffolding strategies for MLs?, (9) What are your lesson delivery strategies? How do these strategies impact/change your students' engagement?, (10) What are your strategies to support MLs' interaction in the classroom? How would you make sure MLs interact with their peers?, (11) How often do you do hands-on activities and manipulatives? Is there any specific way or specific hands-on training and manipulative you use for MLs?, (12) What are your review and assessment strategies for MLs?, (13) Can you describe your successes and challenges in teaching MLs?, (14) How do you see your education experience contributing to MLs' mathematics learning?, and (15) Can you describe your time then you were teaching students including the MLs? And what specific teacher moves did she use to support MLs' understanding and engagement? And how does this example reflect your beliefs and prior experiences with Multilingual Learners?.

The categories I decided on are (1) Monolingual teachers with and without MLs experience, (2) Bilingual teachers with and without MLs experience, (3) Instructional scaffolds, (4) Pre-requisites for effective instruction, (5) Pre-requisites for positive teacher dispositions and identity, (6) Establishing a relationship and building mutual trust and respect, (7) Student motivation and engagement, (8) Translanguaging, (9) Assessment scaffolds, (10) Challenges Faced by Teachers, (11) Teacher Accomplishments, (12) Teacher Perceptions of Good Practice, (13) Instructional Practices, (14) Instructional Resources, (15) No capacity to accommodate/support because of various reasons, (16) Training and Educational Preparation, (17) Additional Support, and (18) Teachers' and MLs' Challenges. Please see Table 3 for a description of each category.

Table 3.
Analytical framework for phase 2

Categories	Definitions and Subcategories with Their Definitions
Monolingual teachers with and without MLs experience	Monolingual teachers with MLs experience: Teachers who speak English as the only language and who have experience working with MLs A monolingual teacher without MLs experience: Teachers who speak English as the only language and who have experience working without MLs
Bilingual teachers with and without MLs experience	Bilingual teachers with MLs experience: Teachers who speak the additional language(s) other than English and who have experience working with MLs A bilingual teacher without MLs experience: Teachers who speak the different language(s) other than English and who have experience working without MLs
Instructional scaffolds	Instructional scaffolds are supports (as a teacher giving informational, instrumental, emotional, or appraisal support to a student) teachers provide students during the instruction, including teacher strategies and resources. Teacher Strategies: Any teacher actions or teacher moves teachers used to scaffold the instruction for MLs. Grouping: Teachers' decision in clustering students to work with their groups either homogenously or heterogeneously Pace: Teachers modify their speed and deliberately pause to provide students with time to think about the question and develop a response Transparency in teaching and learning: Teachers' clarity in giving instruction and communication to improve MLs' learning and encouraging MLs to communicate clearly with their teachers and peers Other: Teacher strategies that do not fit with other subcategories Supporting Academic Literacy: Teachers' strategies to activate MLs' prior content knowledge and background information Comprehensible input: Providing instruction that is at grade level and having high expectations from MLs Teacher Resources: Tools teachers used to scaffold the instruction for MLs Digital Resources: Online tools Print Resources: Written tools
Pre-requisites for effective instruction	Contextual support and tools: Improving the design of learning environments that use multiple teaching modalities
Pre-requisites for positive teacher dispositions and identity	Teachers' mindset that is shaped by teacher dispositions (e.g., beliefs, attitudes, perceptions, culture)

Table 3 (cont'd)

Establish a relationship and build mutual trust and respect	Creating a welcoming environment where MLs can confidently interact with their peers and teachers.
Student motivation and engagement	Students' emotional and mental commitment is the driving force for classroom participation
Translanguaging	Opportunities to communicate and participate through the use of features of multiple languages
Assessment scaffolds:	Assessment scaffolds are supports, strategies, alternatives, and tools that teachers provide students for assessment Assessment Related Strategies: Strategies that teachers use to plan, implement, and evaluate reviews of students Assessment Related Translanguaging: Opportunities to assess students' outcomes through the use of features of multiple languages
Challenges Faced by Teachers	Difficulties teachers report when teaching MLs
Teacher Accomplishments	The success that teachers report when teaching MLs
Teacher Perceptions of Good Practice	Teachers' identification of best instructional practices through their lenses for MLs
Instructional Practices	Teachers' enactment of instruction for MLs
Instructional Resources	Tools that teachers make use of through all stages of instruction for MLs
No capacity to accommodate/support because of various reasons	Teachers demonstrate an unwillingness to accommodate or support MLs
Others	Miscellaneous
Training and Educational Preparation	Teachers' extent of education, training, and experiences [College Degree/Certification; Professional Development/Support of ESL teacher; Self-Training and Learning through the experiences; Advanced Degree]
Additional Support	Teachers need for support of other professionals who are knowledgeable in teaching and understanding MLs

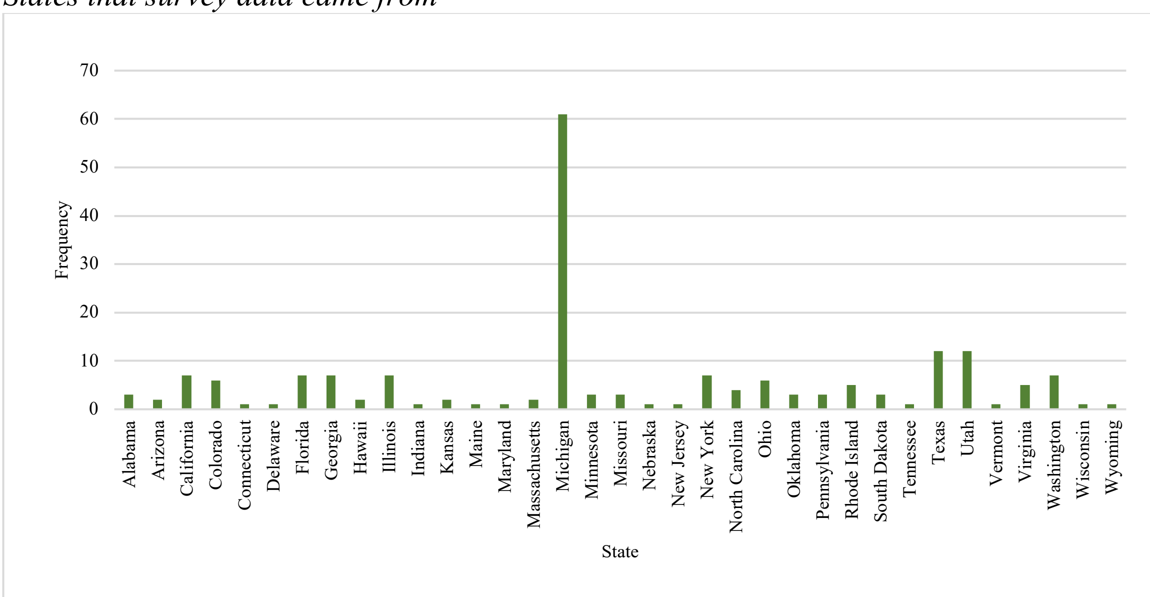
CHAPTER 5: FINDINGS

This section is organized into three subsections including (1) demographic data findings, (2) overall findings from factor analysis and regression analysis of survey data and (3) overall findings from qualitative analysis and four-level of awareness: Parochial, Ethnocentric, Synergistic, and Participatory third culture levels.

Demographic Findings

The data came from teachers from 35 US states (see Figure 6). Most of the data came from Michigan. Participants were middle grades and high school teachers. Results revealed that among 190 teachers, 55% of them had middle grades experiences, while 53% had high school experiences. Some teachers had teaching experiences either as elementary and middle grades teachers or middle grade and high school teachers. For example, while 3% of the teachers have both elementary and middle-grade teaching experiences (n=5), 9% have both middle and high school teaching experiences (n=17).

Figure 6.
States that survey data came from



79% of participants were female, 19% were male, 1% were non-binary, and 1% of them declined to state. Participants shared their races as white (86%), Asian (3%), African American (3%), Middle Eastern (1%), Native American (3%), Mixed (1%), and 3% of them declined to state their race. Additionally, teachers were asked if they were Latino or not; among these participants, 4% of them were, 93% were not Latino, and 3% of them declined to state. The highest degree of teachers was asked, and the responses were Bachelors (16%), Masters (77%), Doctor of Education Degree (2%), and Doctorate (5%). Of teachers, 3% had less than 1-year-experience, 12% had 1-3 years-experience, 8% had 4-6 years of experience, 8% had 7-10 years of experience, and 69% had more than ten years-experience. 95% of teachers stated they had MLs in their classrooms, and 74% of them indicated that they currently had MLs in their classrooms (see Table 4).

Table 4.
Demographic frequency

Gender	Frequency	Degree	Frequency
Female	79%	Bachelors	16%
Male	19%	Masters	77%
Non-binary	1%	Doctor of Education	2%
Decline to state	1%	Doctorate	5%
Race	Frequency	Experience	Frequency
White	86%	Less than a year	3%
Asian	3%	1-3 years	12%
African American	3%	4-6 years	8%
Native American	3%	7-10 years	8%
Middle Eastern	1%	More than 10 years	69%
Mixed	1%		
Declined to state	3%		
Being Latino	Frequency	Having MLs	Frequency
Yes	4%	Yes	95%
No	93%	No	5%
Decline to state	3%		
		Having MLs now	Frequency
		Yes	74
		No	26

Frequencies for Each Survey

I included frequencies for each survey (See Figure 7- Figure 11). I only included the extreme frequencies for each category (Strongly disagree, Disagree, Neither agree nor disagree, Agree, and Strongly Agree for KN-survey). The frequencies with items were represented in the Figure 7 below. For KN survey, the frequency of the responses was highest [84% of teachers (n= 190)] when teachers stated that they strongly agreed with the idea "Cultural differences enrich the lives of members of communities. 84% of teachers stated they strongly agreed with this. On the other hand, the frequency of being strongly agreed was lowest, (0%) for two items: Conflicts sometimes arise between MLs and non-MLs in my mathematics classes and there is a critical age after which it becomes impossible to completely master a second language.

Of teachers' responses for the being aggreged on, the highest frequency was 47%. So, 47% of teachers stated that they strongly agreed that they know how to choose and/or adapt materials that are appropriate for all of the students, and they are able to help students who have had interrupted education succeed in my mathematics classes. However, only 1% of teachers stated that they agreed that MLs with disabilities should not be encouraged to retain their native languages because developing both home language and English is too challenging for them. 1% of teachers agreed that learning in one's first language interferes with learning in a second language. Additionally, 1% of them agreed that if a Multilingual Learner has a disability, there is no need to provide language support because special education service will cover the student's learning needs.

Moreover, in the neither agree nor disagree category, the highest frequency (49%) was obtained when teachers in my building, the social and emotional needs of our MLs are met and parents of MLs believe that it is more important for their children to learn English than to maintain their native language. On the other hand, as the lowest percentage for the neither agree nor disagree category, only 4% teachers stated that cultural differences enrich the lives of members of communities, and they possess the knowledge and skills necessary to teach the mathematical content areas I have been assigned.

For the disagree category, the highest frequency is 43%. This happened when teachers stated that MLs require no more classroom and other school resources than do non-MLs. On the other hand, the frequency was 0 when teachers stated that higher levels of bilingualism can lead to practical, career-related advantages and cultural differences enrich the lives of members of communities. 70% of teachers stated that they strongly disagreed that parents of MLs who don't speak English after having been in America for a long time are probably incapable of ever mastering English. On the contrary, no one stated that they strongly disagreed about if MLs are able to use their L1 (native language) they can access mathematics content more easily, ML students are a welcome addition to my mathematics classroom, higher levels of bilingualism can lead to practical, career-related advantages, and cultural differences enrich the lives of members of communities.

70% of teachers stated that they strongly disagreed that parents of MLs who don't speak English after having been in America for a long time are probably incapable of ever mastering English. On the contrary, no one stated that they strongly disagreed about if MLs are able to use their L1 (native language) they can access mathematics content more easily, ML students are a welcome addition to my mathematics classroom, higher levels of bilingualism can lead to practical, career-related advantages, and cultural differences enrich the lives of members of communities.

Figure 7.
Frequencies for KN-survey items (Item 1- Item 20)

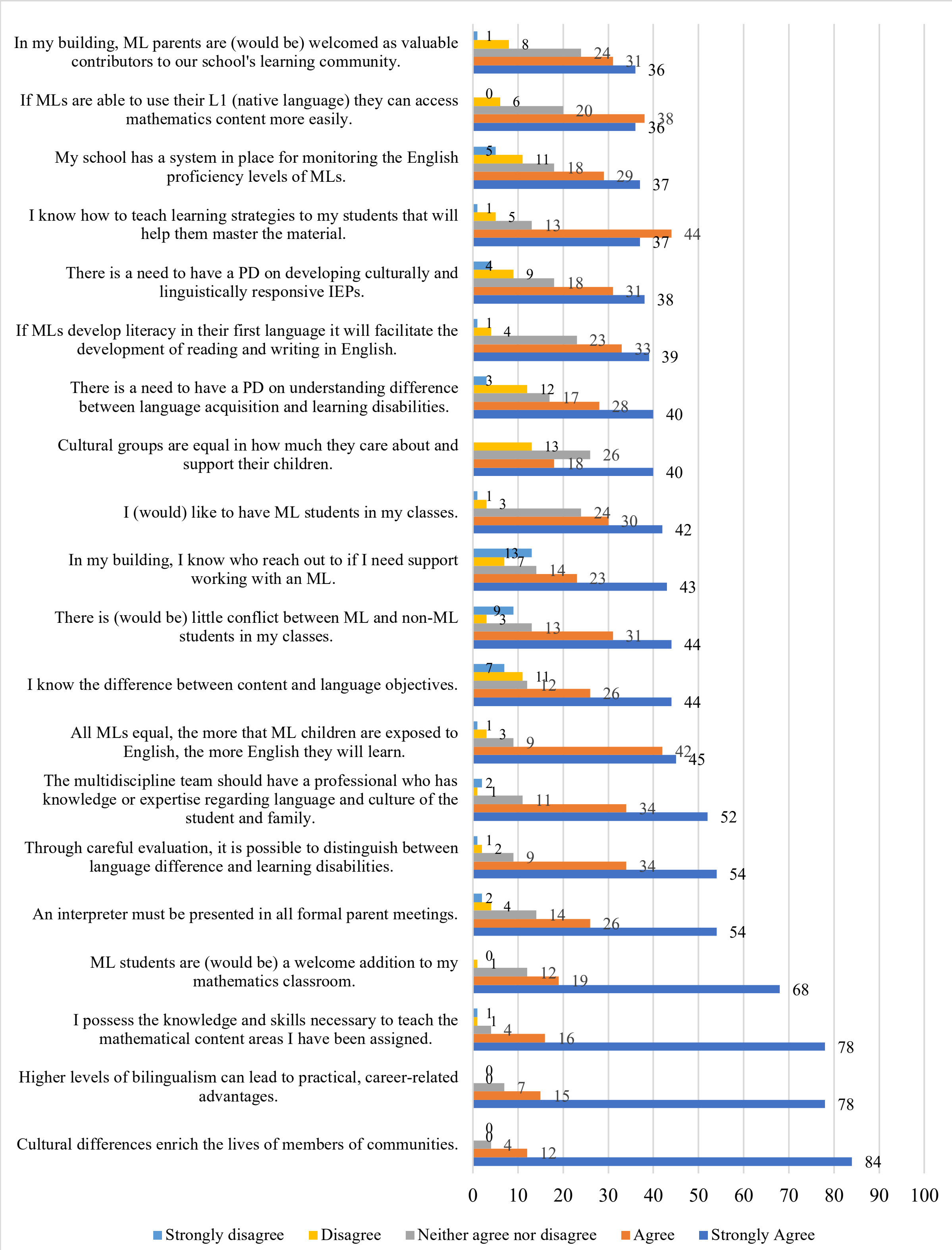


Figure 8.

Frequencies for KN-survey items (Item 21- Item 41)

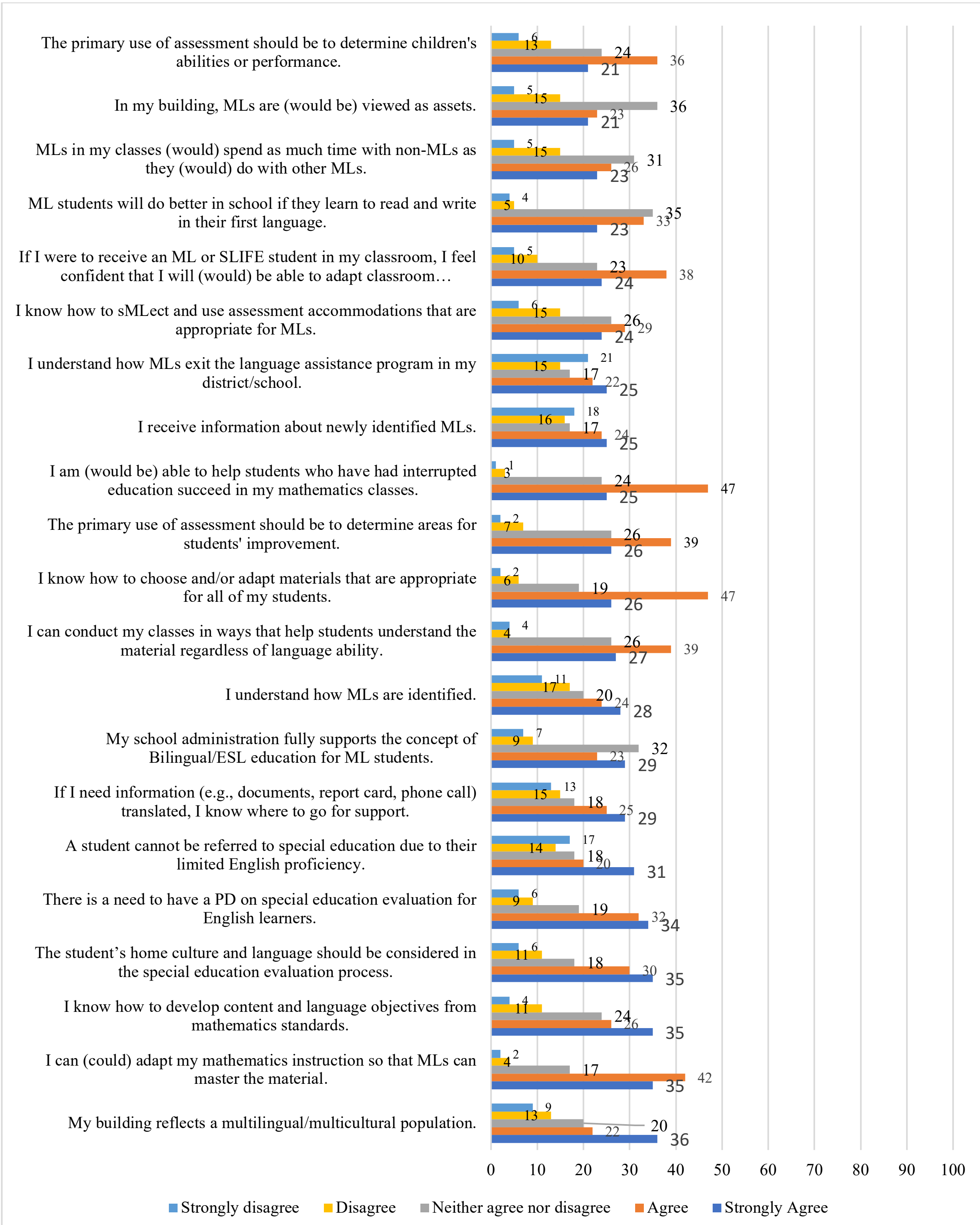


Figure 9.

Frequencies for KN-survey items (Item 42- Item 62)

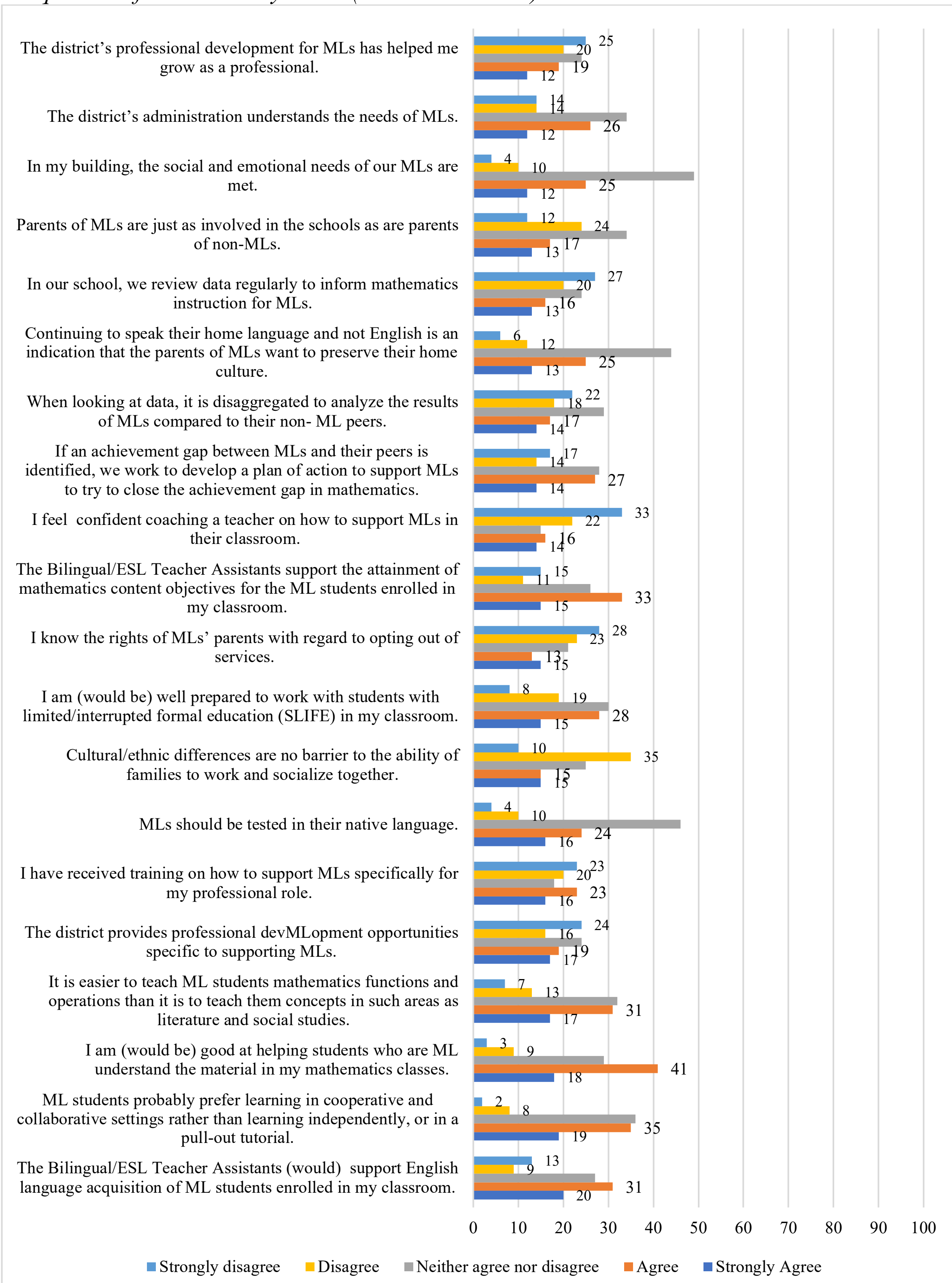


Figure 10.
Frequencies for KN-survey items (Item 62- Item 82)

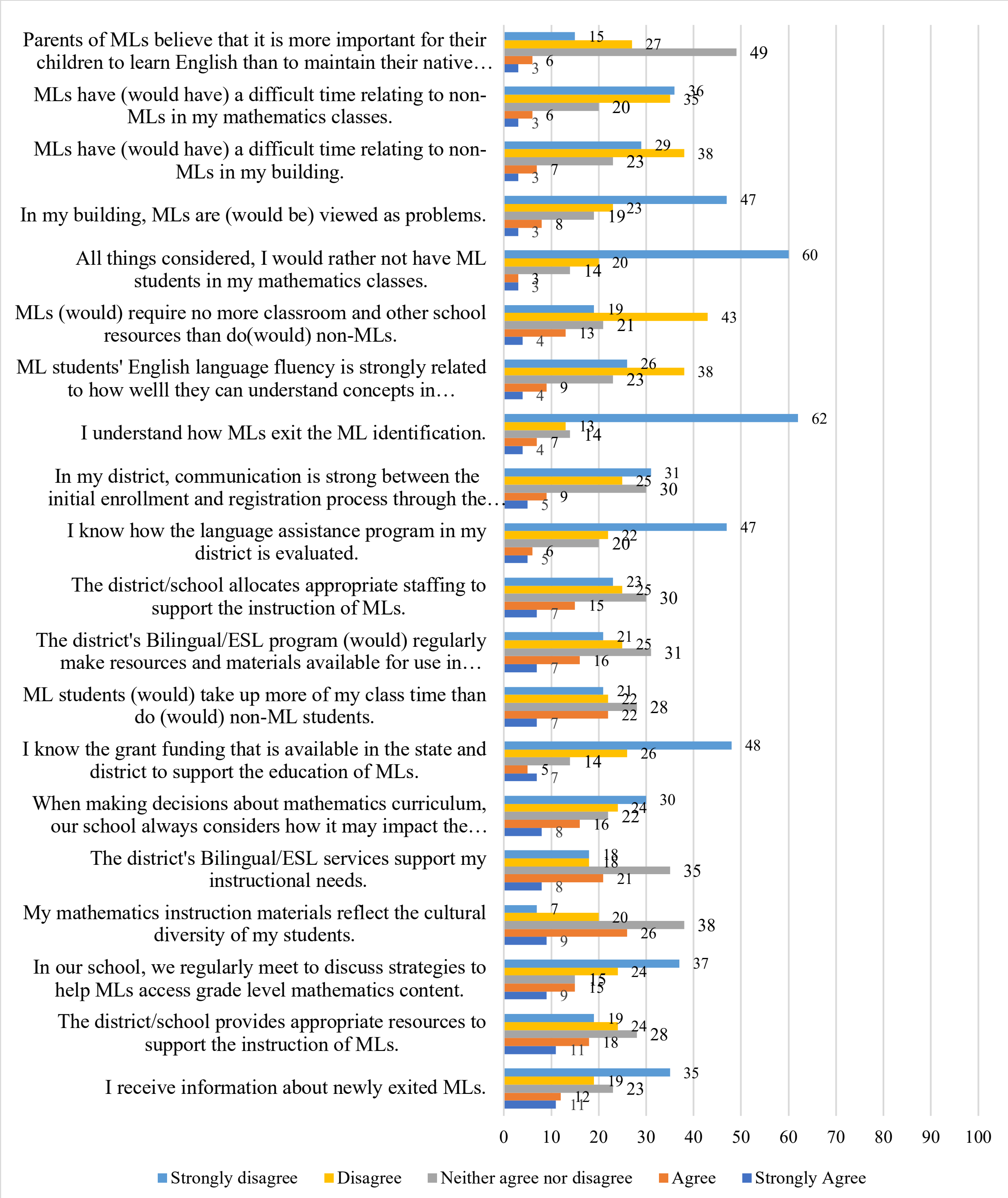
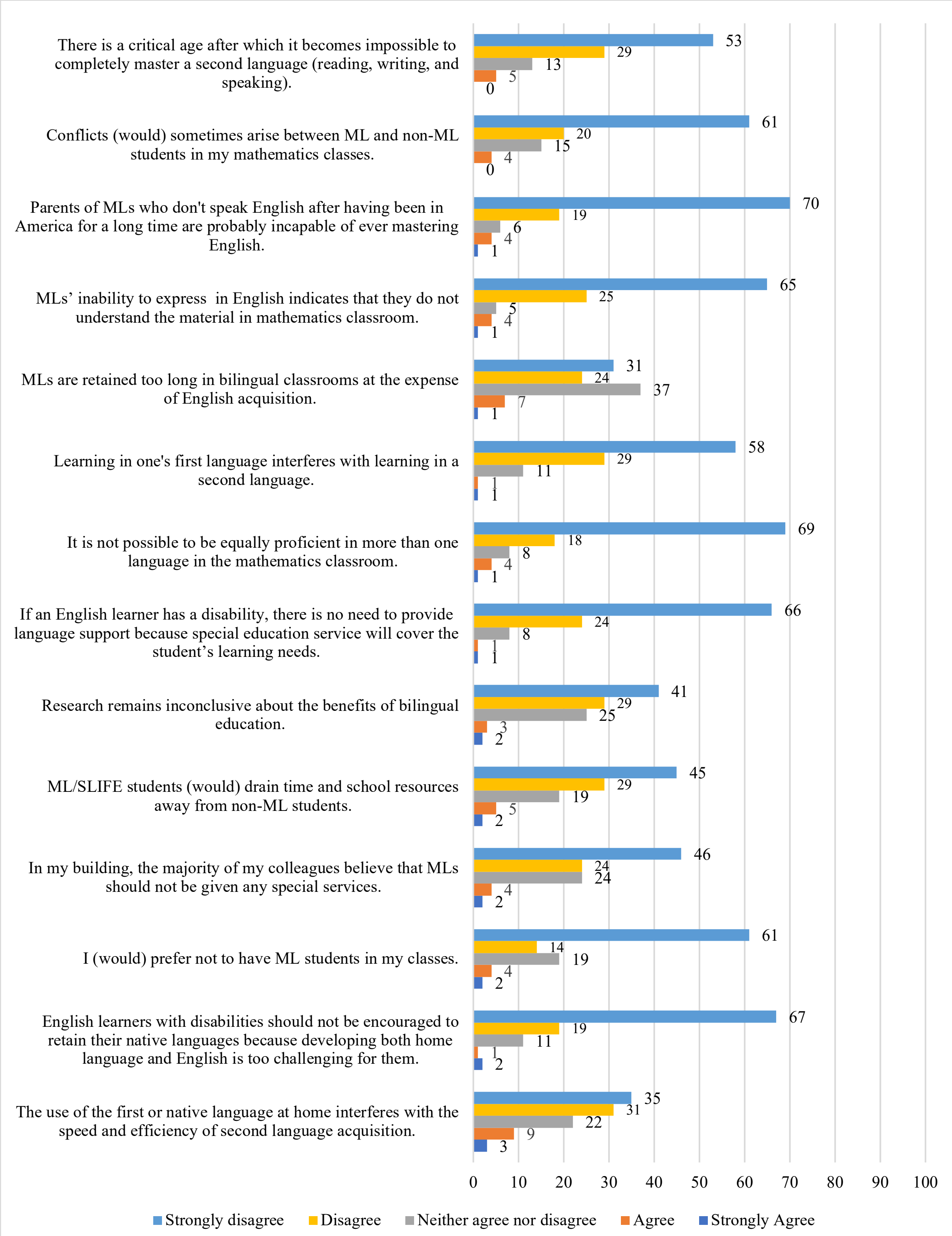


Figure 11.
Frequencies for KN-survey items (Item 82- Item 95)

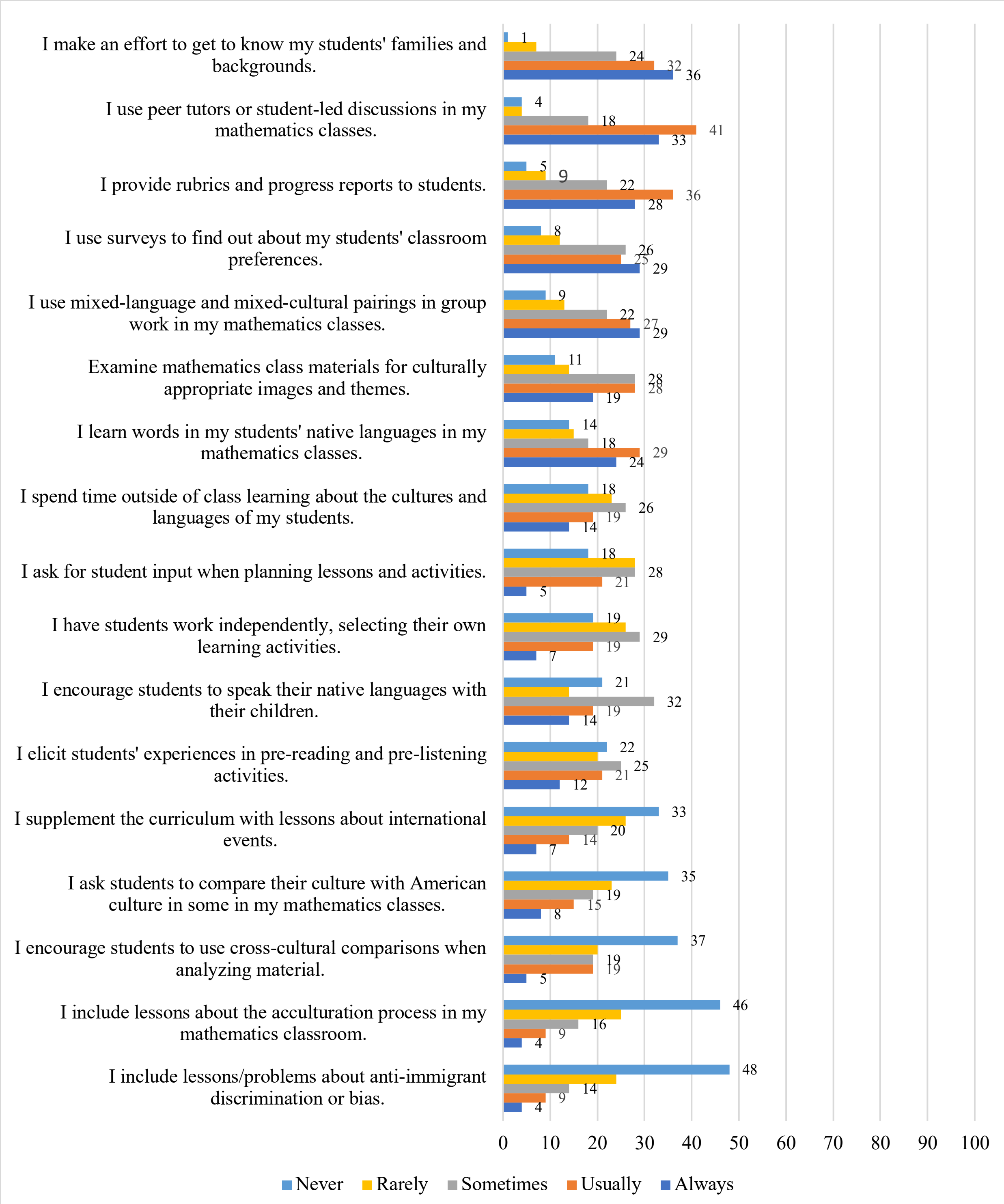


Similar to the KN-survey, I only included the extreme frequencies for each category for Rh-survey (Always, Usually, Sometimes, Rarely, and Never) (Figure 12). The frequencies with items were represented in the Figure 8 below. For Rh survey, as it is seen in the Figure 8, on one hand, the frequency of the responses was highest [36% of teachers (n= 190)] when teachers stated that they always make an effort to get to know my students' families and backgrounds. On the other hand, 4% (they were the lowest percentage for always category answers) of teachers stated that they include lessons/problems about anti-immigrant discrimination or bias and they include lessons/problems about anti-immigrant discrimination or bias.

41% of teachers stated that they usually use peer tutors or student-led discussions in my mathematics classes, whereas only 9% of teachers stated that they usually include lessons about the acculturation process in my mathematics classroom and include lessons/problems about anti-immigrant discrimination or bias.

While 32% teachers stated that they sometimes encourage students to speak their native languages with their children, only 14% of them stated they sometimes include lessons/problems about anti-immigrant discrimination or bias. Additionally, 28% of teachers stated that they rarely ask for student input when planning lessons and activities, while only 4% of them stated that they rarely use peer tutors or student-led discussions in my mathematics classes. Furthermore, 48% of teachers stated that they never include lessons/problems about anti-immigrant discrimination or bias, whereas 1% of teachers stated that they never make an effort to get to know my students' families and backgrounds.

Figure 12.
Frequencies for Rh-survey items



Factor Analysis Findings

As instruments, I used an adapted version of two surveys: Karabenick and Noda [(2004), KN-survey] and Rhodes [(2017), Rh-survey]. Below, I provided findings of factor analysis for each adapted survey separately.

Preliminary Analysis

I analyzed the KN survey, which has 103 items. First, I checked the univariate outliers using frequency tables. No outlier was detected. Also, I checked the univariate skewness and kurtosis. There was no issue with this matter because univariate skewness values were between +2 and −2 (Koh, 2014), and kurtosis values were between +10 and −10 (Brown, 2015). According to Cook's distance test, there were no effective responses (<1). The Mahalanobis distance showed a multivariate non-normality since the value for the Mahalanobis distance is 149.459, which is greater than the critical value (127.689 for df=103, p<.05).

Findings of Factor Analysis of KN-survey

I have searched the relevant literature that has utilized Karabenick and Noda (2004) to figure out if there existed any factor structure that has been shared. I also reached out to the authors to double-check with them. However, I could not find information about the factor structure. That is why I decided to run Explanatory Factor Analysis KN survey.

EFA Analysis for KN-survey. There are 103 items and 190 participants, so it is available for EFA. Data reduction was conducted. The analysis showed that the correlation matrix was suitable for factor analysis. In Table 5, a visual inspection of the correlation matrix was performed, yielding a substantial number of significant correlations.

Table 5.
Factor correlation matrix

Factor	KNf 1	KNf 2	KNf 3	KNf 4	KNf 5	KNf 6	KNf 7
KNf1	1	0.463	0.4	0.486	0.541	0.307	-0.302
KNf 2	0.43	1	0.454	0.491	0.255	-0.01	-0.154
KNf 3	0.4	0.454	1	0.461	0.228	-0.11	-0.014
KNf 4	0.486	0.491	0.461	1	0.17	0.224	-0.043
KNf 5	0.541	0.255	0.228	0.17	1	0.34	-0.449
KNf 6	0.307	-0.01	-0.11	0.224	0.34	1	-0.25
KNf 7	-0.302	-0.154	-0.014	-0.043	-0.449	-0.25	1

The Kaiser-Meyer-Olkin measure of sampling adequacy was .763, and the anti-image correlation matrix of all the diagonals except for 11(94-11=83) was also over .50. All partial correlations were below .50. Bartlett's test of sphericity showed that non-zero correlations with the significance level of .0001 ($\chi2$ (4465) = 10580.565, $p < .01$).

Principal axis factoring was conducted as a factor extraction method with Promax rotation. Both eigenvalue criteria and the scree plot indicated a two-factor solution indicating that there are 26 factors. The total variance between variables is explained by 60% by 26 factors. This is above 50%, which is acceptable. Communalities were checked (to check the relationships of all factors) if they were less than 0.30. There were two items (<.0.3), they were approximately 2.88, so I decided to keep them. Residuals were computed between observed and reproduced correlations. There are 213 (4 %) non-redundant residuals with absolute values greater than 0.05. The goodness of fit is not significant (p>.05) (Maximum Likelihood Estimation), so the number of factors (26 factors) is adequate. Then I checked the pattern matrix. Note that one of the items did not have any factor loading since I suppressed the data using .03 as a threshold. After checking the pattern matrix, I excluded 16 items (items 7, 8, 23, 24, 35, 45, 52, 58, 62, 69, 75, 80, 84, 85, 101,103) which were either loaded on multiple factors with approximately equal (or very close) loadings. Then I re-ran the pattern matrix statistics and I needed to exclude 18 items

(items 16, 43, 90, 81,91,61, 18, 5, 33, 60, 89, 88, 59, 40, 48, 63, 67, 22) with the same reasoning. I repeated the same steps until I found the best model. Next, I excluded more items step by step: items 92, 57, 83, 93, 77; items 74, 99, 36; item 82; items 11, 12, 3, 15; item 34, 76; items 100, 14, 13; items 21, 6; items 30, 31; item 39; item 71. I extracted it using Principal Axis Factoring (see Table 6).

Table 6.
Pattern matrix

Factor	1	2	3	4	5	6	7
KN79	0.812						
KN10	0.772						
KN2	0.761						
KN19	0.727						
KN46	0.695						
KN87	0.679						
KN78	0.612						
KN47	0.57	0.312					
KN1	0.543						
KN9	0.512						
KN98		0.803					
KN95		0.762					
KN96	0.36	0.691					
KN102		0.567					
KN97		0.549					
KN44		0.507					
KN37			0.844				
KN42			0.798				
KN41			0.745				
KN38			0.697				
KN68			0.557				
KN28				0.855			
KN29				0.854			
KN25				0.742			
KN27				0.685			
KN26				0.614			
KN49					-0.953		
KN94					-0.917		
KN86					0.546		
KN32					0.495		
KN65						0.986	

Table 6 (cont'd)

KN66	0.889	
KN64	0.796	
KN17		0.84
KN20		0.638
KN70		0.539
KN4		0.492

Reliability. The reliability of the KN survey was tested using exploratory factor analysis (EFA) and reliability analysis. The entire sample (n = 190) was used to test scale reliability and validity for each latent trait. All seven factors had high reliabilities (all above Cronbach's > .846). For factor five, I had to reverse code which is a common validation technique for survey items, to re-code the responses so that a high score is transformed into the corresponding low score on the scale (e.g., on a 5-point scale, a four is transformed into a 2, and vice-versa). Then I recalculated the reliability.

CFA Analysis for KN-survey. I used the Mplus for CFA (see Table 7). Results revealed 190 observations, 37 dependent variables, and seven continuous latent variables. The input reading terminated normally.

Table 7.
Summary of CFA analysis for KN-survey

Number of groups	1
Number of observations	190
Number of dependent variables	37
Number of independent variables	0
Number of continuous latent variables	7

I checked the Chi-Square test model for the baseline model. According to its results (see Table 8), there is no linear relationships at all among 7 subsets and can be considered a counter part of Bartlett's test of sphericity. The analyzed subsets are notably intercorrelated. I also checked the comparative fit index (CFI) and Tucker-Lewis index (TLI) shows that how far the one factor model is from that baseline model when one compares their lack of fit. If it is close or equal to 1, the considered model fitting much better the data than that baseline model. Here, CFI and TLI are lower than 1, so this is good. A Chi-Square test of model fit shows that the value is 980.678 with 608 degrees of freedom and a p-value < 0.0001. Root Mean Square Error of Approximation (RMSEA) model fit index is a misfit per degree of freedom. That index is relevant to the chi-square value. RMSEA estimate of 0.057 is above 0.05, and the endpoint of the 90% C.I. is at 0.063. SRMR can be defined as the difference between the observed and predicted correlations. Because it is an absolute measure of fit, a value of zero indicates a perfect fit. Standardized Root Mean Square Residual (SRMR) is 0.062. H0 and H1 values show the maximized likelihood. They also display the maximized likelihood for a model which fits the data entirely (i.e., Minus twice the difference in these two values is equal to the chi-square index of fit).

Table 8.
Model fit information

Loglikelihood	
H0 Value	-9154.536
H1 Value	-8664.197
Information Criteria	
Akaike (AIC)	18573.072
Bayesian (BIC)	19001.680
Sample-Size Adjusted BIC	18583.559
Chi-Square Test of Model Fit	
Value	980.678
Degrees of Freedom	608
P-Value	0.0000
RMSEA	
Estimate	0.057
90 Percent C.I.	0.050 0.063
Probability RMSEA <= .05	0.045
CFI/TLI	
CFI	0.902
TLI	0.892
Chi-Square Test of Model Fit for the Baseline Model	

Table 8 (cont'd)

Value	4462.462
Degrees of Freedom	666
Table 8 (cont'd)	
P-Value	0
SRMR	
Value	0.062

Findings of Factor Analysis of Rh-survey

Preliminary Analysis. I analyzed the culturally responsive teaching scale, which has 17 items (see Table 9). First, I checked the univariate outliers using frequency tables. No outlier was detected. Also, I checked the univariate skewness and kurtosis. There was no issue with this matter because univariate skewness values were between +2 and −2 (Koh, 2014), and kurtosis values were between +10 and −10 (Brown, 2015). According to Cook's distance test, there were no effective responses (<1). The Mahalanobis distance showed a multivariate non-normality since the value for the Mahalanobis distance is 42.136, which is greater than the critical value (27.59 for df=17, p<.05). There exist four factors as it is seen in Table 9 and Table 10.

Table 9.
Component matrix for Rh-survey

	Rhf1	Rhf 2	Rhf 3	Rhf 4
R3	.739			
R1	.662			
R2	.660			
R16	.622	.508		
R12	.600			
R5	.590		.580	
R10	.536			
R14	.535			
R15		.746		
R11		.645		
R13		.538		
R8			.714	
R4			.699	
R7				.756

Table 9 (cont'd)

R17	.698
R9	.531
R6	

Table 10.
Component transformation matrix

Factors	Rhf1	Rhf2	Rhf3	Rhf4
Rhf1	.658	.500	.452	.336
Rhf 2	-.449	-.201	.257	.832
Rhf 3	-.020	.503	-.788	.354
Rhf 4	.604	-.676	-.328	.264

Reliability. As Rhodes (2017) reported that "the reliability of sample scores establishes a level of consistency of these unobservable characteristics" (p. 47). Also, she stated that the Cronbach Alpha coefficient value of these means was.78. This shows appropriate levels of internal consistency.

CFA Analysis for Rh-survey. I used the Mplus for CFA (see Table 11). Results revealed 190 observations, 17 dependent variables, and four continuous latent variables. The input reading terminated normally.

Table 11.
Summary of CFA analysis for Rh-survey

Number of groups	1
Number of observations	190
Number of dependent variables	17
Number of independent variables	0
Number of continuous latent variables	4

I checked the Chi-Square test model for the baseline model. According to its results (see Table 12), there is no linear relationships at all among 4 subsets, so they are intercorrelated. I also checked the CFI and TLI that are lower than 1, so this is good. A Chi-Square test of model fit shows that the value is 232.112 with 113 degrees of freedom and a p-value < 0.0001. RMSEA estimate of 0.074 is above 0.05, and the endpoint of the 90% C.I. is at 0.088. SRMR is 0.056. H0 and H1 values show the maximized likelihood, and they are good too.

Table 12.
Model-fit information

Loglikelihood	
H0 Value	-4638.734- -
H1 Value	4522.678
Information Criteria	
Akaike (AIC)	9391.469
Bayesian (BIC)	9391.469
Sample-Size Adjusted BIC	9395.997
Chi-Square Test of Model Fit	
Value	232.112
Degrees of Freedom	113
P-Value	0.0000
RMSEA	
Estimate	0.074
90 Percent C.I.	0.061- 0.088
Probability RMSEA <= .05	0.002
CFI/TLI	
CFI	0.902
TLI	0.882
Chi-Square Test of Model Fit for the Baseline Model	
Value	1347.114
Degrees of Freedom	136
P-Value	0
SRMR	
Value	0.056

Therefore, the factors of KN-survey are (1) Teachers' MLs Strategies for academic support (KNf1), (2) Systematic school and district resources available for teachers of MLs to support for identification and placement (KNf2), (3) District and school Level supports available at administrator level (KNf3), (4) Data driven decision making about curriculum and instruction for MLs (KNf4), (5) Teachers' willingness to work with MLs (KNf5), (6) Teachers' need for PD to support for culturally responsive teaching and support MLs' learning and engagement (KNf6), and (7) Teachers' beliefs about language acquisition (bilingualism and translanguaging) (KNf7). Additionally, the factors of Rh-survey are (1) Establishing Inclusion (Rhf1), (2) Encouraging autonomy and cultural awareness of students and collaborative decision making with all (Rhf2), (3) Establishing trust and relationships (Rhf3), (4) providing transparent feedback and assessment (Rhf4).

In Table 13, I provided the name factors (i.e., KNf1, KNf2, KNf3, KNf4, KNf5, KNf6, KNf7 from Karabenick-Noda Survey and Rhf1, Rhf2, Rhf3, and Rh4 from Rhodes Survey) with their descriptions. I created the operational descriptions for the factors in the light of the data items, teachers' responses, interview data, and my analytical framework (see Table 3 above).

Table 13.
Factors

#	Factors (Theme)	Description
KNf1	Teachers' MLs Strategies for academic support	Strategies that teachers use to support MLs academic needs such as use of appropriate materials, instructional resources, standards, objectives, scaffolding strategies (e.g., grouping, pacing, wait time, transparency in teaching, comprehensible input), assessment tools
Items	• I can conduct my classes in ways that help students understand the material regardless of language ability. • I know how to develop content and language objectives from standards. • I can adapt my instruction so that MLs can master the material. • I know how to select and use assessment accommodations that are appropriate for MLs. • I am good at helping students who are ML understand the material in my classes. • I feel confident coaching a teacher on how to support MLs. • I know the difference between content and language objectives. • I am well prepared to work with students with limited/interrupted formal education (SLIFE) in my classroom. • I know how to choose and/or adapt materials that are appropriate for all of my students. • If I were to receive an ML or SLIFE student in my classroom, I feel confident that I will adapt classroom instruction to meet his/her needs.	

Table 13 (cont'd)

KNf2	Communication about systematic school and district procedures for dentification and placement of MLs with teachers	Foundational procedural information that are provided for teachers to establish initial rapport with MLs as pre-requisites for effective instruction
Items	• If I need information (e.g., documents, report card, phone call) translated, I know where to go for support. • My school has a system in place for monitoring the English proficiency levels of MLs. • I understand how MLs are identified. • I receive information about newly identified MLs. • I understand how MLs exit the language assistance program in my district/school. In my building, I know who reach out to if I need support working with an ML.	
KNf3	District and school level supports available at administrator level	Contextual support and resources that provided for teachers to improve to the instructional design for MLs
Items	• The district's Bilingual/ESL services support my instructional needs. • The district's administration understands the needs of MLs. • The district/school provides appropriate resources to support the instruction of MLs. • The district/school allocates appropriate staffing to support the instruction of MLs. The district's Bilingual/ESL program (would) regularly make resources and materials available for use in classrooms.	
KNf4	Data driven decision making about curriculum and instruction for MLs	Being knowledgeable and competent about using student data to make curricular and instructional decisions for MLs
	• In our school, we review data regularly in order to inform instruction for MLs. • When looking at data, it is disaggregated in order to analyze the results of MLs compared to their non-ML peers. • If an achievement gap between MLs and their peers is identified, we work to develop a plan of action to support MLs to try to close the achievement gap. • In our school, we regularly meet to discuss strategies to help MLs access grade level content. • When making decisions about curriculum, our school always considers how it may impact the learning experiences of our MLs.	

Table 13 (cont'd)

KNf5	Teachers' willingness to work with MLs	Teachers' positive dispositions (e.g., beliefs, attitudes, perceptions, culture) to support MLs learning and engagement
Items	• ML students are (would be) a welcome addition to my classroom. • All things considered; I would rather not have ML students in my classes. • I (would) like to have ML students in my classes. • I (would) prefer not to have ML students in my classes.	
KNf6	Teachers' need for PD to support for culturally responsive teaching and support MLs' learning and engagement	Consistent and sustainable support for teachers to improve their culturally responsive instructional practices
Items	• There is a need to have a PD on understanding difference between language acquisition and learning disabilities. • There is a need to have a PD on special education evaluation for English learners. • There is a need to have a PD on developing culturally and linguistically responsive IEPs.	
KNf7	Teachers' Beliefs about language acquisition (bilingualism and translanguaging)	Teachers' beliefs and perceptions about how languages are learned and sustained, and it effects on their mathematics teaching
Items	• MLs are retained too long in bilingual classrooms at the expense of English acquisition. • Learning in one's first language interferes with learning in a second language. • Research remains inconclusive about the benefits of bilingual education. The use of the first or native language at home interferes with the speed and efficiency of second language.	
Rhf1	Establishing inclusion	Teachers' use of culturally responsive instructional practices to be inclusive to all students
Items	• I include lessons about the acculturation process in my mathematics classroom. • Examine mathematics class materials for culturally appropriate images and themes. • I ask students to compare their culture with American culture in some in my mathematics classes.	

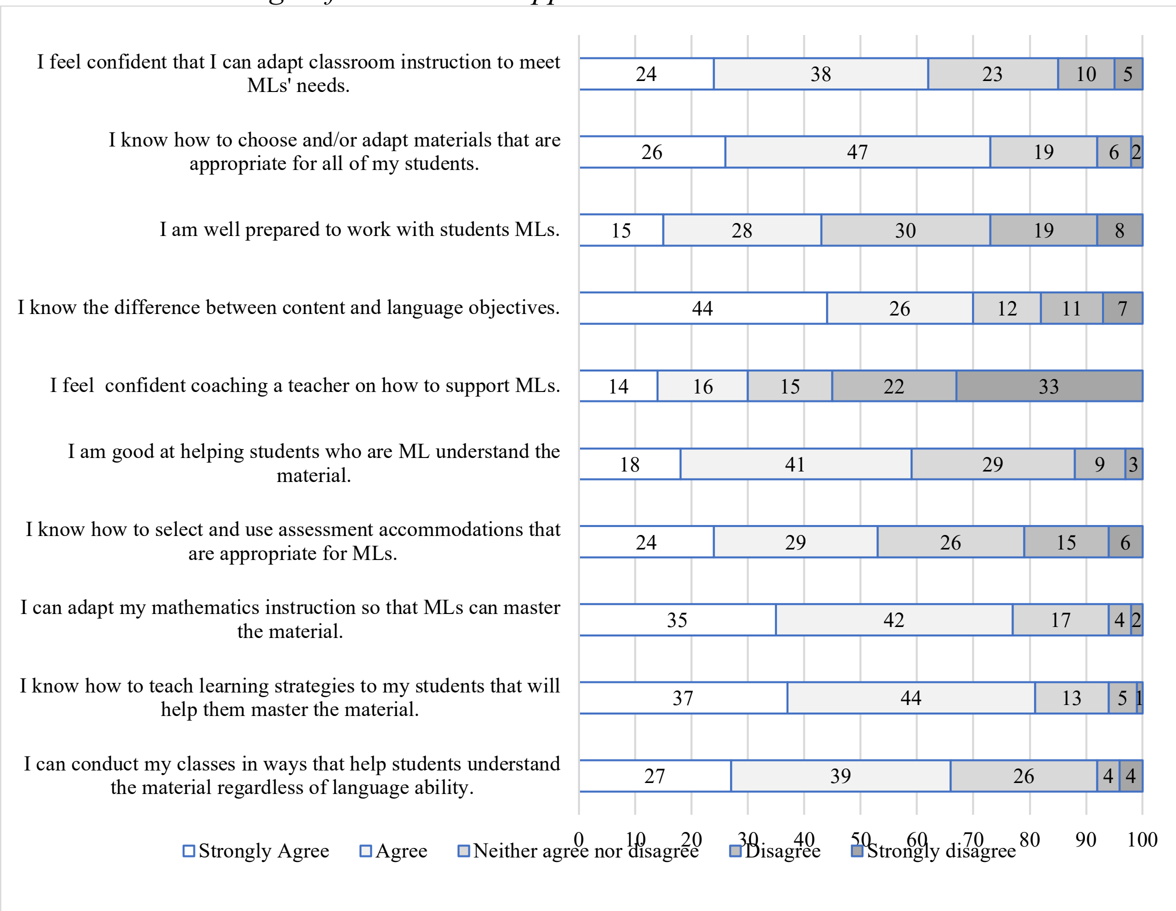
Table 13 (cont'd)

	• I learn words in my students' native languages in my mathematics classes. • I encourage students to speak their native languages with their children. • I spend time outside of class learning about the cultures and languages of my students. • I supplement the curriculum with lessons about international events. • I encourage students to use cross-cultural comparisons when analyzing material.	
Rhf2	Encouraging autonomy and cultural awareness of students and collaborative decision making with all	Co-constructing culturally responsive classroom practices with students
Items	• I have students work independently, selecting their own learning activities. • I include lessons/problems about anti-immigrant discrimination or bias. • I ask for student input when planning lessons and activities.	
Rhf3	Establishing trust and relationships	Creating a welcoming classroom climate where MLs can confidently interact with their peers and teachers without hesitation
Items	• I make an effort to get to know my students' families and backgrounds. I use surveys to find out about my students' classroom preferences.	
Rhf4	Providing transparent feedback and assessment	Strategies that teachers use to plan, implement, and evaluate reviews of students transparently
Items	• I use peer tutors or student-led discussions in my mathematics classes. • I elicit students' experiences in pre-reading and pre-listening activities. I provide rubrics and progress reports to students.	

Factor Analysis Findings for Each Theme

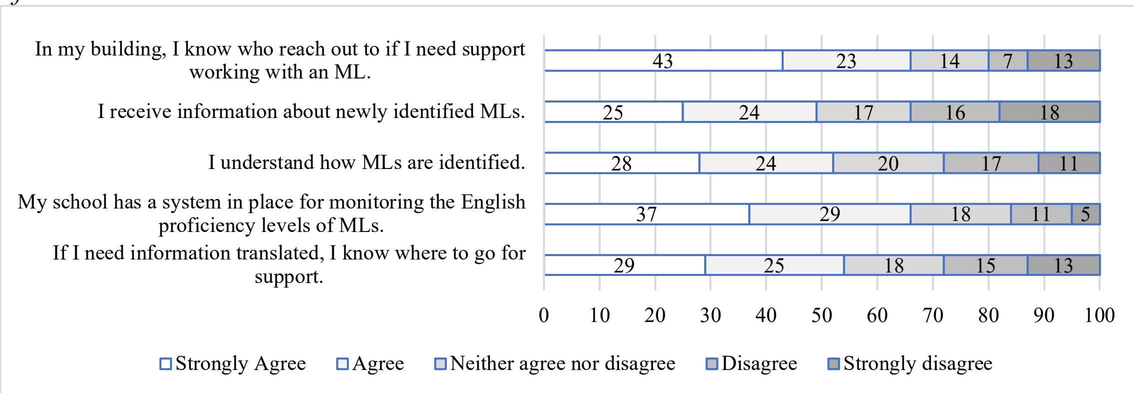
For items of each theme (factor), I presented the results below (see Table 14-Table 24). Less than half of the teachers stated that they can adapt their mathematics instruction for their MLs (35%) and know the learning strategies that their MLs can benefit from (37%). With a different perspective, when combined the strongly agree and agree responses, I can also say that more than half of the teachers stated that they were mostly feeling confident to adapt materials to their adapted instruction to teach mathematics using different teaching and learning strategies so that their MLs can master the instructional materials and content. However, they were less confident about coaching a teacher on how to support MLs (see Figure 13).

Figure 13.
Teachers' MLs strategies for academic support



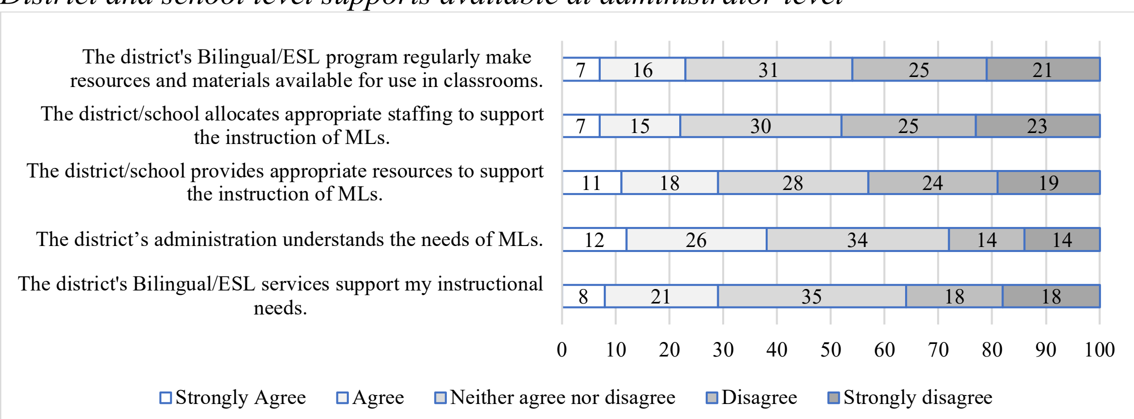
When I combined the strongly agreed and agreed results, I can say that more than half of the teachers were saying that they were familiar about the communication about the systematic school and district procedures for identification and placement of MLs. More specifically more than the half of the teachers were mentioning that they knew who and how they can reach out at their schools if they need any help about MLs. However less than half of them (49%) stated that they do not receive information about newly identified MLs (see Figure 14).

Figure 14.
Communication about systematic school and district procedures for identification and placement of MLs with teachers



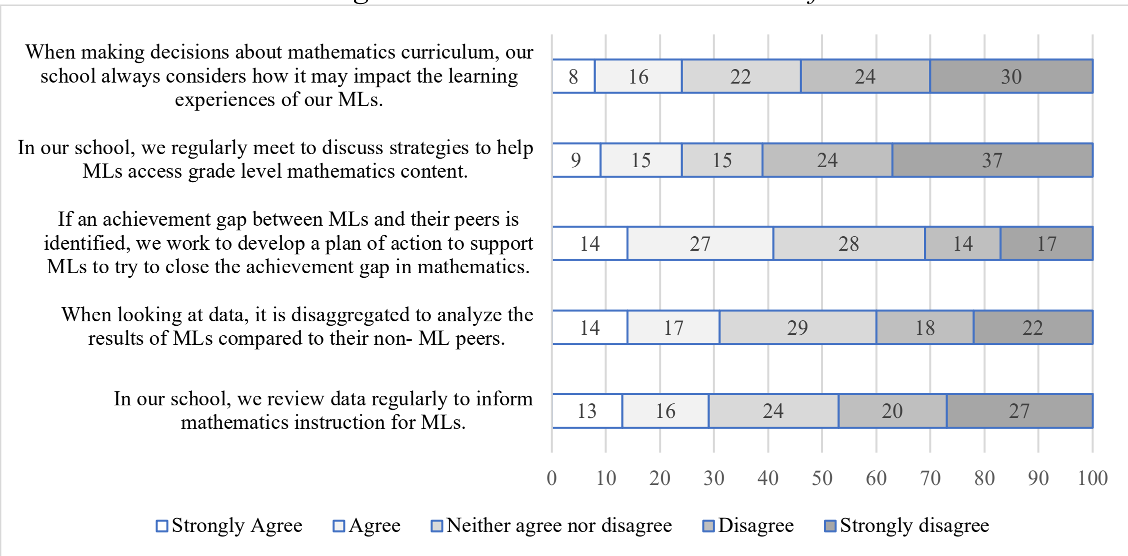
Similarly, when I combined the strongly agreed and agreed responses of teachers, I can say that teachers were not feeling confident about the district and school level supports available at administrator level for MLs (see Figure 15). This was an opposite result of the results on Figure 13. Approximately only less than 30% teachers agreed that the district makes and provides resources for MLs, allocates staff support, and supports teachers' instructional needs.

Figure 15.
District and school level supports available at administrator level



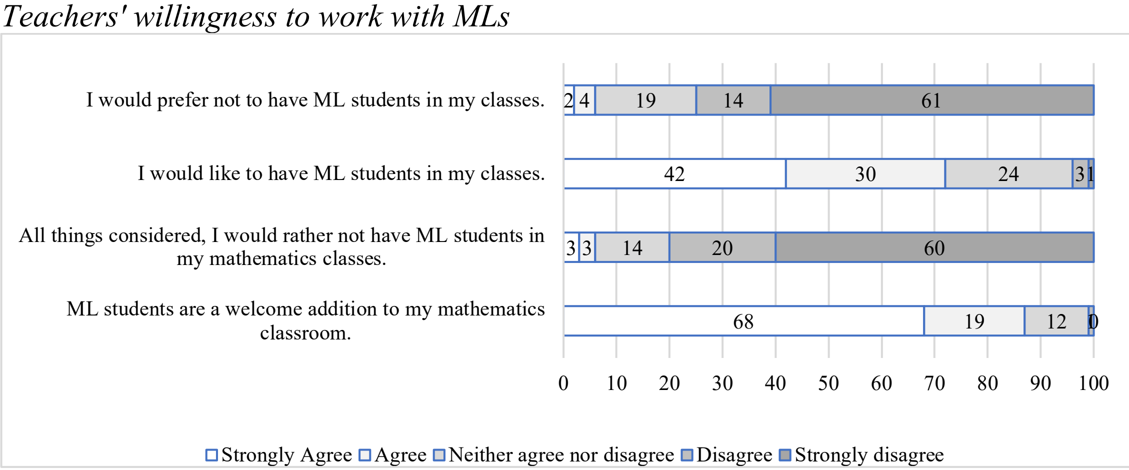
When I combined the strongly agreed and agreed responses of teachers, less than 30% of teachers stated that they agreed that their schools make decisions about the curriculum considering MLs, regularly meet to discuss strategies to support MLs, and review data regularly to inform mathematics instruction for MLs (see Figure 16).

Figure 16.
Data driven decision making about curriculum and instruction for MLs



When I combined the strongly agreed and agreed responses of teachers, less than 10% of teachers prefers not to have MLs in their classrooms and 42% of teachers agreed that they would like to have MLs and 68% of teachers agreed that MLs are welcome addition to their classroom (see Figure 17).

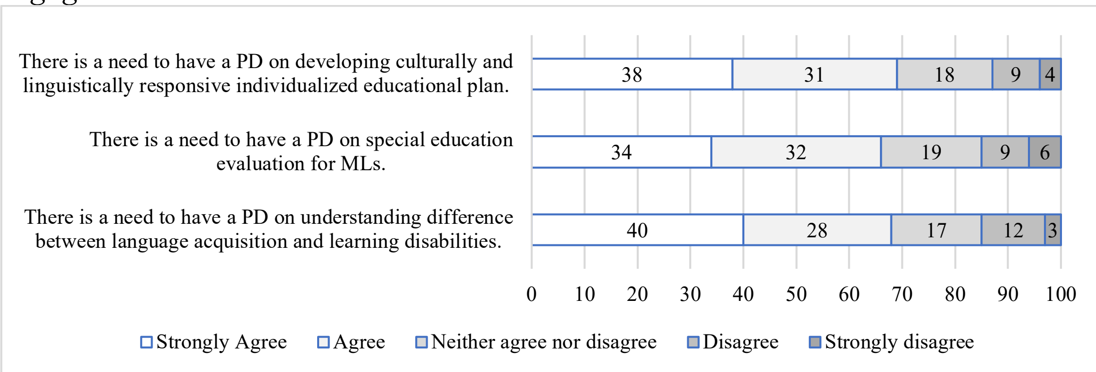
Figure 17.
Teachers' willingness to work with MLs



More than 30% of teachers agreed that there is a need for PD on developing culturally and linguistically responsive individualized plans, for PD on special education, and for PD on language acquisition (see Figure 18).

Figure 18.

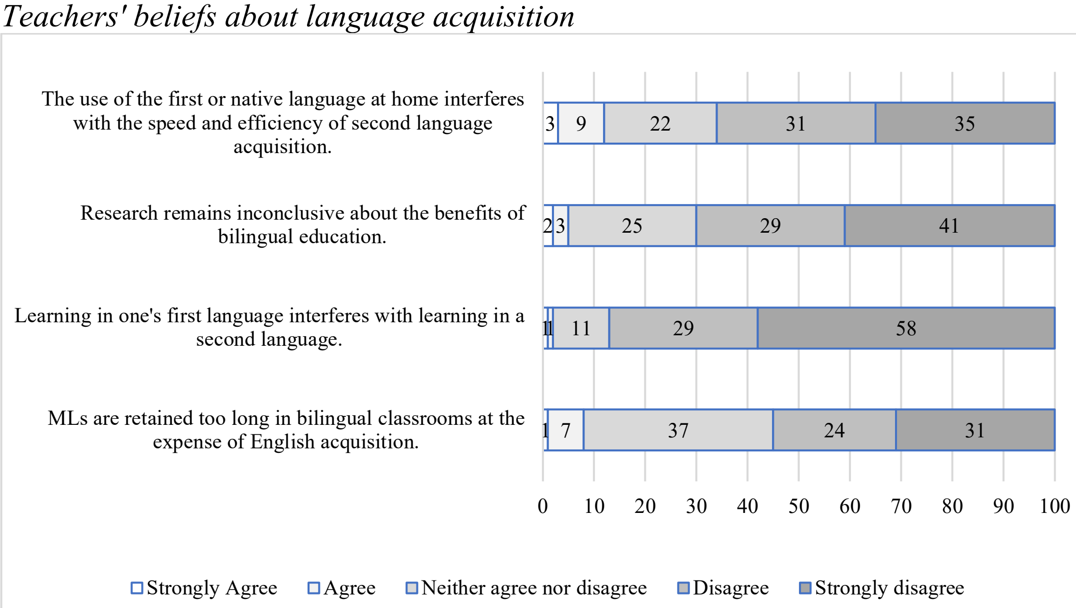
Teachers' need for PD for culturally responsive teaching and support MLs' learning and engagement



Additionally, less than 10% of teachers stated that they agreed that research remains inconclusive about the benefits of bilingual education, learning in one's first language interferes with learning in a second language, and MLs are retained long in bilingual classroom at the expense of the English acquisition. However, 12 % of teachers agreed that the use of first language at home interferes with the speed and efficiency of second language acquisition (see Figure 19).

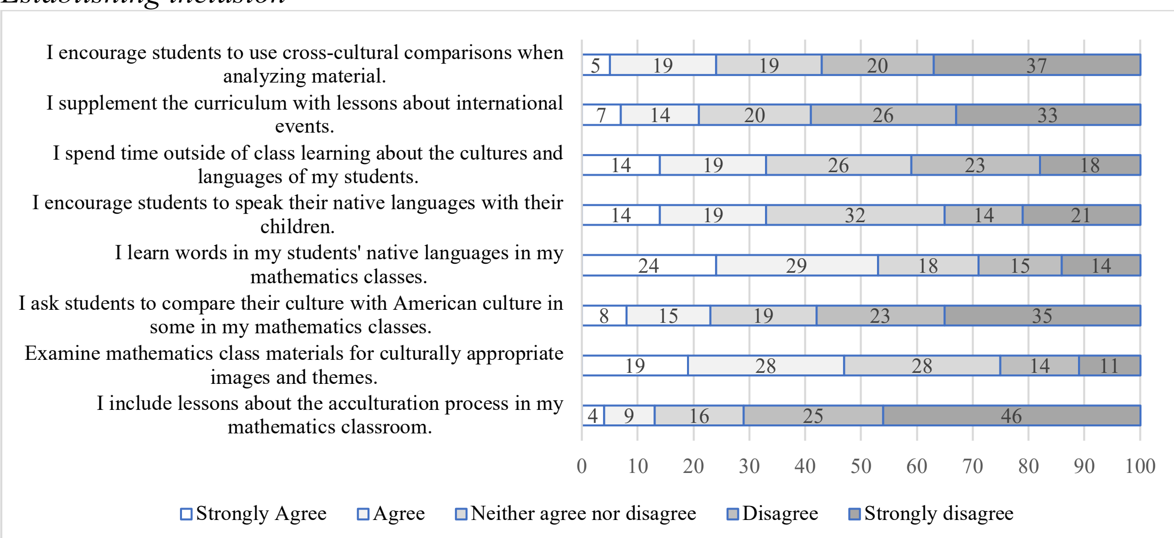
Figure 19.

Teachers' beliefs about language acquisition



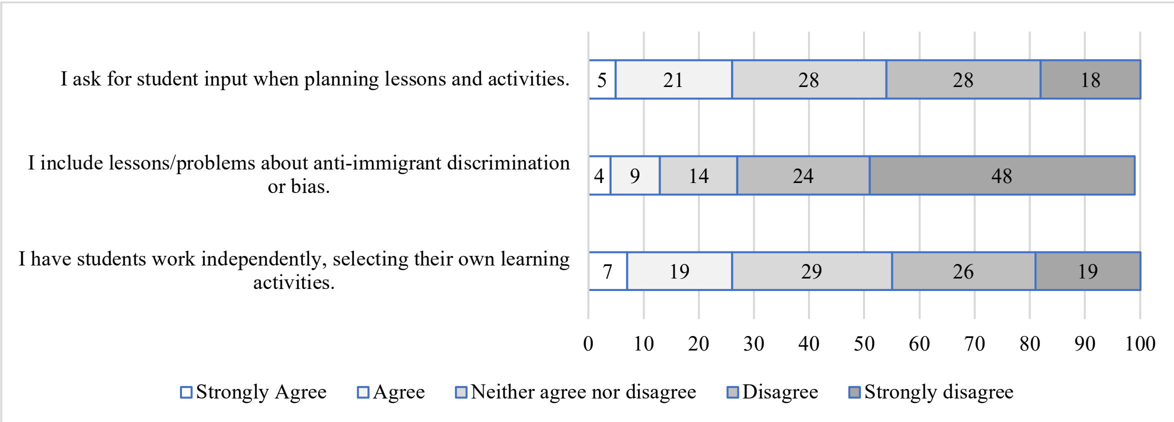
When combined the strongly agreed and agreed responses, less than 30% of teachers stated that they agreed that they established inclusion by encouraging students to use the cross cultural comparisons when analyzing materials, supplement the curriculum with lessons about international events, spend time outside of the classroom to learn about different cultures, ask their students to compare their culture with American culture, and include lessons about the acculturation process in mathematics classroom. However, more than 40% of teachers agreed that they learn words in their students' native languages and examine the mathematics materials if they are culturally responsive or not (see Figure 20).

Figure 20.
Establishing inclusion



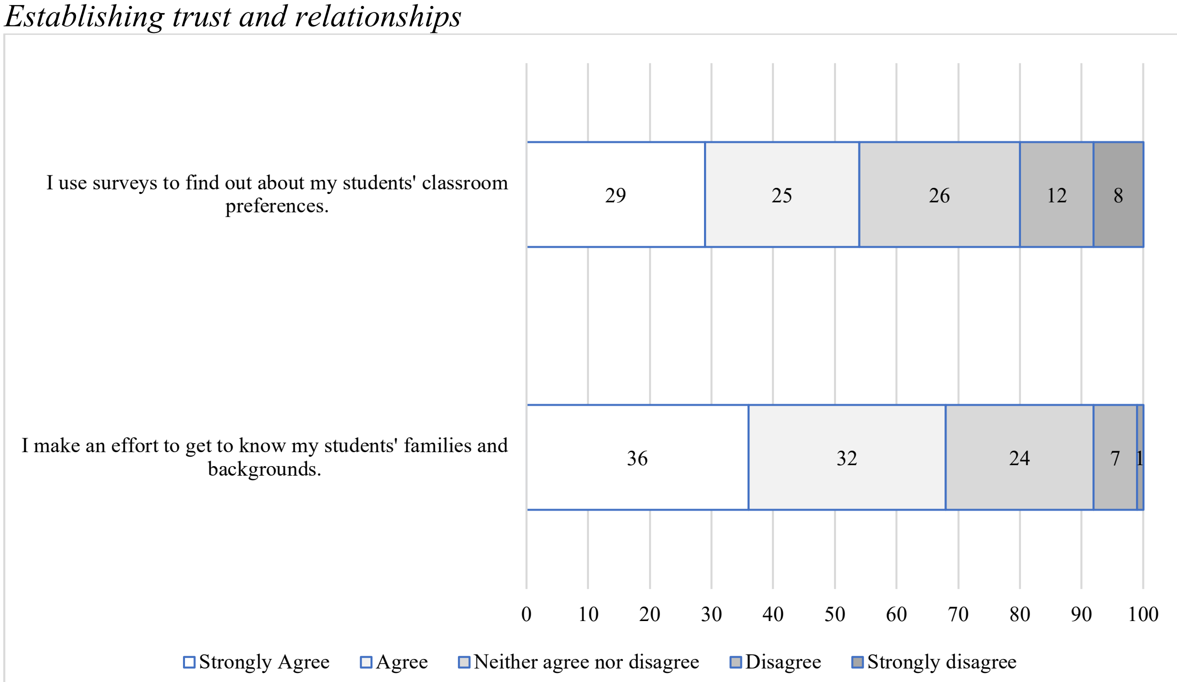
When the teachers' responses for strongly agreed and agreed are combined, less than 30% of teachers were encouraging autonomy and cultural awareness of students and collaborative decision making with all. More specifically less than 30% of teachers agreed that they ask for students' input, include lessons about discrimination, or have students work independently. More than 40% of teachers were not including anti-bias lessons or problems in their instruction (see Figure 21).

Figure 21.
Encouraging autonomy and cultural awareness of students and collaborative decision making with all



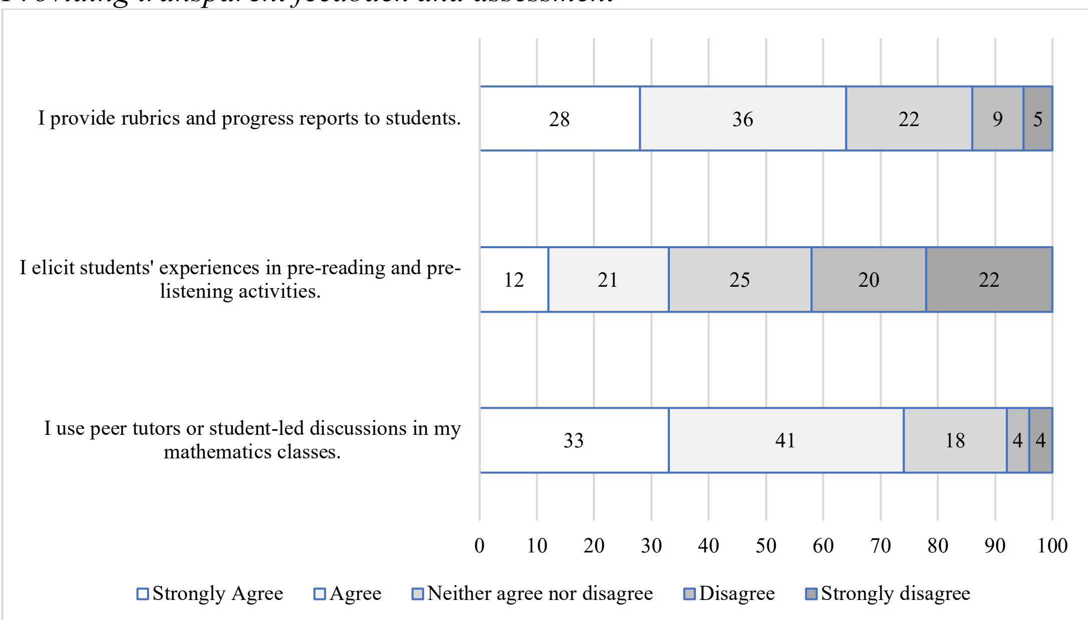
When teachers' responses for strongly agreed and agreed are combined, more than half of the teachers agreed that they establish trust with their MLs by using surveys to find out about their students' classroom preferences and by making an effort to get to know their students' families and backgrounds (see Figure 22).

Figure 22.
Establishing trust and relationships



Whereas more than half of the teachers were providing rubrics and progress reports to students and use peer tutors or student-led discussion in their classes, 33% of them agreed that they elicit students' experiences in pre reading and pre listening activities to provide transparent feedback and assessment (see Figure 23).

Figure 23.
Providing transparent feedback and assessment



Regression Analysis Findings

I conducted regression analysis when independent variables are coming from the demographic survey questions – (1) Please write the name of the state you teach in [in the data set, coded as State], (2) Please specify grade span as a mathematics teacher [in the data set, coded as Grade 1 if the response is Elementary; Grade2 if the response is Middle Grades; Grade3 if the response is High School], (3) Have you received any training on MLs? [in the data set, coded as Training], (4) Has your training on MLs helped you better support all of your students (both MLs and non-MLs)? [in the data set, coded as Training Support], (5) Where did you receive your training? [in the data set, coded as TrainingPlace1 if the respond includes in-district professional development; TrainingPlace2 if the respond includes My own, self-directed study;

TrainingPlace3 if the respond includes an institute of higher education; TrainingPlace4 if the respond includes an alternative pathway; TrainingPlace5 if the respond includes Department of Education promoted professional development workshops], (6) Please list any languages, other than English, with which you are fluent and the degree of your fluency (reading, writing, speaking) in each language [in the data set, coded as Bilingual],, (7) What is your race? [in the data set, coded as Race], (8) Do you identify as Hispanic/Latino? [in the data set, coded as Hispanic], (9) What is your gender? [in the data set, coded as Gender], (10) What is your highest level of education? [in the data set, coded as HighestDegree], (11) How long have you worked in the field of mathematics education? [in the data set, coded as WorkYear], (12) In your school, which Language Assistance Programs are currently used? [in the data set, coded as LangAsisstance1 if the response includes English as Second Language (ESL) pull-out; LangAsisstance2 if the response includes English as Second Language (ESL) pull-in; LangAsisstance3 if the response includes separate content area course; LangAsisstance4 if the response includes dual-language; LangAsisstance5 if the response includes Sheltered Content Instruction; LangAsisstance6 if the response includes newcomer program; LangAsisstance7 if the response includes Collaborative ESL and general], (13) In your school, which staff members are primarily responsible for the education of MLs? [in the data set, coded as MLsResponsible1 if the response includes MLs teacher; MLsResponsible2 if the response includes assistant principals; MLsResponsible3 if the response includes assistant principals; MLsResponsible4 if the response includes general teacher education; MLsResponsible5 if the response includes MLs teacher assistant; MLsResponsible6 if the response includes Special Education Teacher; MLsResponsible7 if the response includes Other], (14) Have you ever had MLs in your classes? [HaveMLs], (15) Do you have MLs in your classes now? [MLsClass], (16) What would you need to know more about in order to better serve the educational and developmental needs of MLs? [in the data set, coded as Need1 if the response includes Identifying MLs; Need2 if the response includes Monitoring the English proficiency levels of MLs; Need3 if the response includes Monitoring the English proficiency levels of MLs; Need4 if the response includes Monitoring the academic progress of MLs; Need5 if the response includes Engaging the parents of MLs; Need6 if the response includes Implementing response to intervention (RTI/MTSS) services with MLs; Need7 if the response includes Implementing ML instructional models as they are intended to be implemented; Need8 if the response includes Making time for general education teachers to collaborate with ML teachers; Need9 if the response includes Finding appropriate resources to support the education of MLs; Need10 if the response includes The "tools" or instruments to identify students with limited/interrupted formal education (SLIFE); Need11 if the response includes ways that I can use the cultural and linguistic resources of MLs to teach my English monolingual students about another language or culture; Need12 if the response includes the history, culture, and arts of ML students' home culture; Need13 if the response includes ways that I can infuse and enrich my curriculum with the diversity of the global community's cultures and languages; Need14 if the response includes teaching the English language reading and language arts to pre-literate ML students].

The dependent variables are the factors for KN-survey such that (1) Teachers' MLs Strategies for academic support (KNf1), (2) Systematic school and district resources available for teachers of MLs to support for identification and placement (KNf2), (3) District and school Level supports available at administrator level (KNf3), (4) Data driven decision making about curriculum and instruction for MLs (KNf4), (5) Teachers' willingness to work with MLs (KNf5), (6) Teachers' need for PD to support for culturally responsive teaching and support MLs' learning and engagement (KNf6), and (7) Teachers' beliefs about language acquisition (bilingualism and translanguaging) (KNf7). Additionally, the dependent variables are the factors for Rh-survey such that (1) Establishing Inclusion (Rhf1), (2) Encouraging autonomy and cultural awareness of students and collaborative decision making with all (Rhf2), (3) Establishing trust and relationships (Rhf3), (4) providing transparent feedback and assessment (Rhf4).

First, I checked whether there is a linear relationship between the independent variables and the dependent variable in our multiple regression model. To do this, I checked scatter plots for each dependent variable. I also checked for multivariate normality by checking normal Q-Q plots of each dependent variable. I found that multivariate normality is present in the population data since the deviations from the straight line are minimal (see Figure 9). Q-Q plot just offers a quick way to visually check if the residuals are normally distributed. On a Q-Q plot, if the residuals fall along a roughly straight line at a 45-degree angle, then the residuals are roughly normally distributed. However, in the Q-Q plot below that the residuals tend to deviate from the 45-degree line quite a bit, especially on the tail ends, which could be an indication that they are not normally distributed. When residuals deviate severely from the 45-degree line in the Q-Q plot, I can consider performing a transformation on the response variable in the regression (such that using the log of the response variable). However, in this case, the residuals only deviate slightly, so I did not transform the response variable. I checked whether there is a linear relationship between the independent variables and the dependent variable in our multiple regression model. I found that multivariate normality is present in the population data since the deviations from the straight line are minimal (see Figure 24).

Figure 24

Q-Q plots for KNf1, KNf2, KNf3, KNf4, KNf5, KNf6, KNf7, Rhf1, Rhf2, Rhf3, and Rhf4 respectively in order (from left to right)

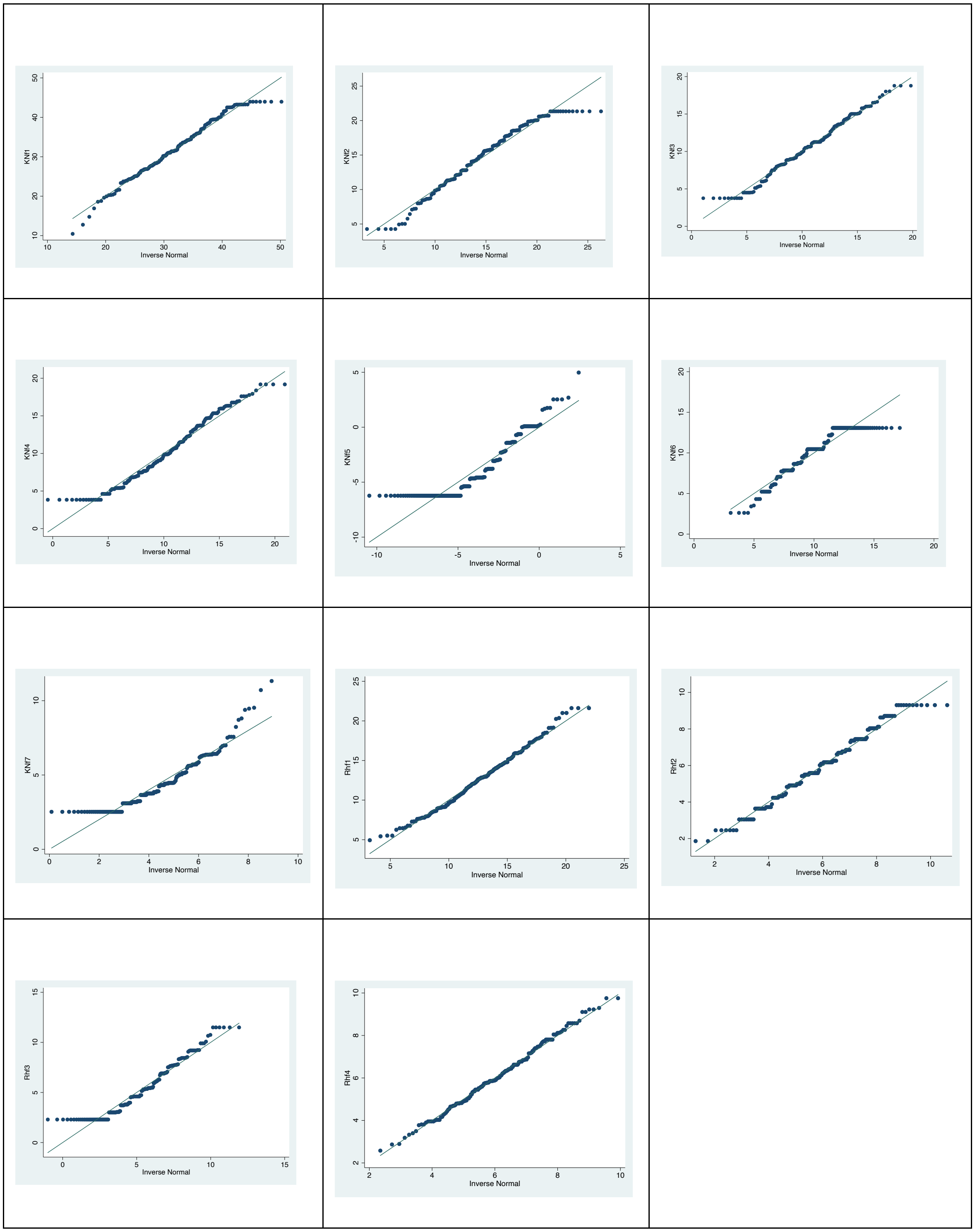


Table 14 showed the Durbin-Watson statistics. A value of Durbin-Watson 2.0 means that there is no autocorrelation. The rule of thumb to accept the value of Durbin-Watson statistics as relatively normal is values between 1.5 and 2.5 (White, 1992). Therefore, the results for each construct showed that there is no autocorrelation since the values ranged approximately between 1.9 and 2.2 that falls the in the interval of 1.5 and 2.5 (see Table 14). This shows that I was good to run a regression analysis (White, 1992).

Table 14.
Durbin-Watson

Dependent Variable	Durbin Watson	Predictors
KNf1	2.241	TrainingSupport, Need8, LangAssistance9, HighestDegree, TrainingPlace4, MLsResponsible3, Need4
KNf2	1.863	TrainingSupport, MLsResponsible1, Need2, LangAssistance9, LangAsistance2, Need13, LangAssistance5, Billingual, MLsResponsible5
KNf3	1.935	MLsResponsible1, MLsResponsible5, TrainingSupport, Need11, Training, Need8, HaveMLs, LangAssistance6
KNf4	1.973	TrainingSupport, LangAsistance2, LangAssistance5, MLsResponsible2
KNf5	2.055	TrainingSupport, Need11, LangAssistance9, MLsResponsible1, Need12, Need3
KNf6	1.945	Need11
KNf7	1.850	MLsResponsible4, TrainingSupport
Rhf1	1.818	Need8, LangAssistance5, LangAssistance9, Need14, TrainingPlace4, WorkYear, Need10
Rhf2	1.817	MLsClass, Need11, Need14, Hispanic, Need7, TrainingPlace4
Rhf3	1.962	TrainingSupport, MLsResponsible3
Rhf4	2.096	Need2, TrainingPlace4, WorkYear, TrainingPlace5, MLsResponsible7

I also checked the correlation that shows the strength of an association between all factors. If the two variables are associated it means that when one changes by a certain amount the other changes on an average by a certain amount. According to Table 15 below, there is no strong correlation between factors.

Table 15.
Correlation between factors

	ID	KNf1	KNf2	KNf3	KNf4	KNf5	KNf6	KNf7	Rhf1	Rhf2	Rhf3	Rhf4
ID	1											
KNf1	-0.034	1										
KNf2	0.015	0.51	1									
KNf3	0.005	0.44	0.512	1								
KNf4	-0.151	0.527	0.545	0.507	1							
KNf5	0.056	0.586	0.289	0.246	0.188	1						
KNf6	-0.047	0.326	-0.007	-0.119	0.241	0.361	1					
KNf7	-0.038	-0.348	-0.179	-0.024	-0.053	-0.512	-0.279	1				
Rhf1	-0.167	0.53	0.298	0.194	0.356	0.351	0.122	-0.167	1			
Rhf2	0.103	0.155	-0.071	0.028	0.101	0.074	0.256	-0.114	0	1		
Rhf3	-0.008	0.31	0.207	0.023	0.179	0.26	0.297	-0.236	0	0	1	
Rhf4	-0.008	0.277	0.215	0.089	0.139	0.191	0.072	-0.22	0	0	0	1

Regression analysis when KNf1 (i.e., Teachers' MLs strategies for academic support) is dependent variable

According to stepwise regression analysis below, there exist seven models all of which are significant results. The Model 7 as a set, showed that the seven variables: (1) Training Support (Has your training on MLs helped you better support all of your students (both MLs and non-MLs)?), (2) Need8 (What would you need to know more about in order to better serve the educational and developmental needs of MLs? –Finding appropriate resources to support the education of MLs), (3) LangAssistance9 (In your school, which Language Assistance Programs are currently used? –I do not know), (4) Highest Degree (What is your highest level of education?), (5) TrainingPlace4 (Where did you receive your training? – In-district professional development), (6) MLsResponsible3 (In your school, which staff members are primarily responsible for the education of MLs? –Principal), and (7) Need4 (What would you need to know more about in order to better serve the educational and developmental needs of MLs? – Engaging the parents of MLs). As it is seen in Table 16, the seven variables accounted for significant variation, R-square=.430, F (1,179) = 5.781, p< .05. The R-square for the model 1 was .198. The predictors explain the approximately 20% of the KNf1 in the model 1. In the second model, the R-square change was .103. So, with the model to approximately 10% more was explained when Need8 added near TrainingSupport predictor. Similarly, the R-square change from model 2 to 3 (when LanguageAssistantce9 added to predictor list) is approximately 4%, so 34% of KNf1 is explained. Additionally, the R-square change was approximately 3% from model 3 to model 4. The R-square changes approximately 2% from model 4 to model 5 and 2% from model 5 to model 6. In model 6, approximately 41% of KNf1 was explained by TrainingSupport, Need8, LangAssistance9, HighestDegree, TrainingPlace4, MLsResponsible3. These increments all happened statistically significant way. Model 6 to Model 7 is computed as .430 (Model 7) - .412 (Model 6), which is.018. The increment in variation accounted for is statistically significant, F (1,179) =4.507, p=.017. The p-value with the inclusion of this variable meet the inclusion criterion of .05.

Table 16.
Model summary

	R	R Square	Adjusted R Square	Std Err	R Square Change	F Change	df1	df2	Sig F Change
1	.445[a]	.198	.194	.86737754	.198	45.653	1	185	<.001
2	.548[b]	.301	.293	.81205598	.103	27.065	1	184	<.001
3	.583[c]	.340	.329	.79140038	.039	10.730	1	183	.001
4	.605[d]	.366	.352	.77743285	.027	7.635	1	182	.006
5	.624[e]	.389	.373	.76506715	.023	6.931	1	181	.009
6	.642[f]	.412	.392	.75310443	.022	6.796	1	180	.010
7	.656[g]	.430	.408	.74329748	.018	5.781	1	179	.017

a. Predictors: (Constant), TrainingSupport

Table 16 (cont'd)

b. Predictors: (Constant), TrainingSupport, Need8
c. Predictors: (Constant), TrainingSupport, Need8, LangAssistance9
d. Predictors: (Constant), TrainingSupport, Need8, LangAssistance9, HighestDegree
e. Predictors: (Constant), TrainingSupport, Need8, LangAssistance9, HighestDegree, TrainingPlace4
f. Predictors: (Constant), TrainingSupport, Need8, LangAssistance9, HighestDegree, TrainingPlace4, MLsResponsible3
g. Predictors: (Constant), TrainingSupport, Need8, LangAssistance9, HighestDegree, TrainingPlace4, MLsResponsible3, Need4

On one hand, as it is seen in Table 17, in Model 7, for KNf1, the β values for Need8, LangAssitance9, and Need4 were negative and significant. β for (1) Need8 was -.658 with S.E. (standard error) =.116, and $p<.05$, (2) LangAssitance9 was -.435 with S.E. =.139 and $p<.05$, (3) Need4 was -.207 with S.E. =.086 and $p<.05$. On the other hand, the β values for TrainingSupport, HighestDegree, TrainingPlace4, and MLsResponsible3 were positive and significant. β for (1) TrainingSupport was .370 with S.E.=.068 and $p<.05$, (2) HighestDegree was .207 with S.E. =.070 and $p<.05$, (3) TrainingPlace4 was .677 with S.E. =.237 and $p<.05$, and (4) MLsResponsible3 was .896 with S.E. =.312and $p<.05$.

Table 17.
Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		β	Std. Error	Beta	t	Sig.
7	(Constant)	-.392	.209		-1.876	.062
	TrainingSupport	.370	.068	.325	5.469	<.001
	Need8	-.658	.116	-.335	-5.683	<.001
	LangAssistance9	-.435	.139	-.183	-3.135	.002
	HighestDegree	.207	.070	.168	2.943	.004
	TrainingPlace4	.677	.237	.165	2.852	.005
	MLsResponsible3	.896	.312	.164	2.870	.005
	Need4	-.207	.086	-.138	-2.404	.017

According to ANOVA table below for KNf1 (see Table 18), the model one has TrainingSupport, model 2 has TrainingSupport, Need8, the model 3 has TrainingSupport, Need8, LangAssistance9, the model 4 has TrainingSupport, Need8, LangAssistance9, HighestDegree, the model 5 has TrainingSupport, Need8, LangAssistance9, HighestDegree, TrainingPlace4, the model 6 has TrainingSupport, Need8, LangAssistance9, HighestDegree, TrainingPlace4, MLsResponsible3, and the model 7 has TrainingSupport, Need8, LangAssistance9, HighestDegree, TrainingPlace4, MLsResponsible3, Need4 as predictors. All models included are statistically significant. All models are significantly useful in explaining KNF1. I selected the model 7 which is statistically significant and, F (7, 186) = 19.298, $p < .05$.

Table 18.
ANOVA for KNf1

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	34.347	1	34.347	45.653	<.001[b]
	Residual	139.184	185	.752		
	Total	173.531	186			
2	Regression	52.195	2	26.097	39.575	<.001[c]
	Residual	121.336	184	.659		
	Total	173.531	186			
3	Regression	58.915	3	19.638	31.355	<.001[d]
	Residual	114.616	183	.626		
	Total	173.531	186			
4	Regression	63.529	4	15.882	26.278	<.001[e]
	Residual	110.001	182	.604		
	Total	173.531	186			
5	Regression	67.586	5	13.517	23.093	<.001[f]
	Residual	105.944	181	.585		
	Total	173.531	186			
6	Regression	71.441	6	11.907	20.993	<.001[g]
	Residual	102.090	180	.567		
	Total	173.531	186			
7	Regression	74.635	7	10.662	19.298	<.001[h]
	Residual	98.896	179	.552		
	Total	173.531	186			

To sum up, TrainingSupport, Need8, LangAssistance9, HighestDegree, TrainingPlace4, MLsResponsible3, Need4 as predictors explained the KNf1: Teachers' MLs Strategies for academic support in a statistically significant way. As it is mentioned before, approximately 40% of KNf1 was explained by predictors listed above.

The Variance Inflation Factor (VIF) measures the impact of collinearity among the variables in the regression model. VIF is 1/Tolerance, it is always greater than or equal to 1. Values of VIF that exceed 10 are often regarded as indicating multicollinearity. The value of tolerance should be > 0.1 (or VIF < 10) for all variables, which they are. The collinearity table (see Table 19) below showed that the VIFs range from 1 to 1.109. Especially I checked the model 7, the VIF and tolerance values are good (see Table 19).

Table 19.
Collinearity

Model		Sig.	Collinearity Statistics Tolerance	VIF
1	(Constant)	<.001		
	TrainingSupport	<.001	1.000	1.000
2	(Constant)	.187		
	TrainingSupport	<.001	.967	1.034
	Need8	<.001	.967	1.034
3	(Constant)	.665		
	TrainingSupport	<.001	.936	1.069
	Need8	<.001	.953	1.049
	LangAssistance9	.001	.946	1.057
4	(Constant)	.019		
	TrainingSupport	<.001	.928	1.077
	Need8	<.001	.953	1.049
	LangAssistance9	.002	.942	1.061
	HighestDegree	.006	.990	1.010
5	(Constant)	.035		
	TrainingSupport	<.001	.907	1.102
	Need8	<.001	.920	1.087
	LangAssistance9	.002	.942	1.061

Table 19 (cont'd)

	HighestDegree	.009	.987	1.013
	TrainingPlace4	.009	.950	1.053
6	(Constant)	.025		
	TrainingSupport	<.001	.907	1.103
	Need8	<.001	.918	1.090
	LangAssistance9	.003	.934	1.071
	HighestDegree	.007	.987	1.013
	TrainingPlace4	.005	.946	1.057
7	(Constant)	.062		
	TrainingSupport	<.001	.902	1.109
	Need8	<.001	.917	1.091
	LangAssistance9	.002	.931	1.074
	HighestDegree	.004	.980	1.020
	TrainingPlace4	.005	.946	1.057

Regression analysis when KNf2 (i.e., Systematic school and district resources available for teachers of MLs to support for identification and placement) is dependent variable

According to stepwise regression analysis below, there exist seven models all of which are significant results. The Model 9 as a set, showed that the seven variables: (1) TrainingSupport (Has your training on MLs helped you better support all of your students (both MLs and non-MLs)?), (2) MLsResponsible1 (In your school, which staff members are primarily responsible for the education of MLs? –MLs teachers), (3) Need2 (What would you need to know more about in order to better serve the educational and developmental needs of MLs? –Monitoring the English proficiency levels of MLs), (4) LangAssistance9 (In your school, which Language Assistance Programs are currently used? –I do not know), (5) LangAsistance2 (In your school, which Language Assistance Programs are currently used? – ESL push-in), (6) Need13 (What would you need to know more about in order to better serve the educational and developmental needs of MLs? –Teaching the English language reading and language arts to preliterate MLs), (7) LangAssistance5 (In your school, which Language Assistance Programs are currently used? – Sheltered Content Instruction), (8) Billingual (Please list any languages, other than English, with which you are fluent and the degree of your fluency in each language), (9) MLsResponsible5 (In your school, which staff members are primarily responsible for the education of MLs? –MLs teacher assistant(s). The nine variables (TrainingSupport, MLsResponsible1, Need2, LangAssistance9, LangAsistance2, Need13, LangAssistance5, Billingual, MLsResponsible5) accounted for significant variation, R-square=.469, $F(1,177) = 4.303$, $p < .05$ (see Table 20).

The R-square for the model 1 was .147. The predictors explain the approximately 15% of the KNf2 in the model 1. In the second model, the R-square change was .089. So, with the model to approximately 9% more was explained when MLsResponsible1 added near TrainingSupport predictor. Similarly, the R-square change from model 2 to 3 (when Need2 added to predictor list) is approximately 7%, so 31% of KNf1 is explained. Additionally, the R-square change was approximately 6% from model 3 to model 4. The R-square changes approximately 3% from model 4 to model 5 and 3% from model 5 to model 6. In model 6, approximately 42% of KNf2 was explained by TrainingSupport, MLsResponsible1, Need2, LangAssistance9, LangAsistance2, and Need13. These increments all happened statistically significant way. Model 6 to Model 7 is computed as .443 the change is.017. Model 7 to Model 8 is computed as .456 the change is.014. Model 8 to Model 9 is computed as .469 the change is.013. All these increments are statistically significant. More specifically, the increment in variation accounted for is statistically significant for the latest model: Model 9 which has $F(1,177) =4.303$, $p<.05$. The p-value with the inclusion of this variable meet the inclusion criterion of .05.

Table 20.
Model summary

	Collinearity Statistics

Table 20 (cont'd)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.383[a]	.147	.142	.86363631	.147	31.861	1	185	<.001
2	.485[b]	.236	.227	.81969911	.089	21.364	1	184	<.001
3	.550[c]	.303	.291	.78508740	.067	17.581	1	183	<.001
4	.604[d]	.365	.351	.75149171	.062	17.728	1	182	<.001
5	.628[e]	.395	.378	.73551023	.030	8.995	1	181	.003
6	.652[f]	.425	.406	.71869015	.031	9.571	1	180	.002
7	.665[g]	.443	.421	.70974272	.017	5.567	1	179	.019
8	.676[h]	.456	.432	.70283092	.014	4.538	1	178	.035
9	.685[i]	.469	.442	.69639959	.013	4.303	1	177	.039

a. Predictors: (Constant), TrainingSupport

b. Predictors: (Constant), TrainingSupport, MLsResponsible1

c. Predictors: (Constant), TrainingSupport, MLsResponsible1, Need2

d. Predictors: (Constant), TrainingSupport, MLsResponsible1, Need2, LangAssistance9

e. Predictors: (Constant), TrainingSupport, MLsResponsible1, Need2, LangAssistance9, LangAsistance2

f. Predictors: (Constant), TrainingSupport, MLsResponsible1, Need2, LangAssistance9, LangAsistance2, Need13

g. Predictors: (Constant), TrainingSupport, MLsResponsible1, Need2, LangAssistance9, LangAsistance2, Need13, LangAssistance5

h. Predictors: (Constant), TrainingSupport, MLsResponsible1, Need2, LangAssistance9, LangAsistance2, Need13, LangAssistance5, Billingual

i. Predictors: (Constant), TrainingSupport, MLsResponsible1, Need2, LangAssistance9, LangAsistance2, Need13, LangAssistance5, Billingual, MLsResponsible5

On one hand, in Model 9 (see Table 21), for KNf2, the β values for Need2, LangAssitance9, Need13, and Bilingual were negative and significant. β for (1) Need2 was -.402

with S.E.=.113, and p<.05, (2) LangAssitance9 was -.436 with S.E. =.136 and p<.05, (3) Need13 was -.529 with S.E. =.146 and p<.05, and (4) Bilingual was -.143 with S.E.= .066 and p<.005. On the other hand, the β values for TrainingSupport, MLsResponsible1, LangAssistance2, LangAssistance5, and MLsResponsible5 were positive and significant. β for (1) TrainingSupport was .257 with S.E.=.06 and p<.05, (2) MLsResponsible1 was .431 with S.E. =.112 and p<.05, (3) LangAssistance2 was .340 with S.E. =.118 and p<.05, and (4) LangAssistance5 was .362 with S.E. =.143 and p<.05, and (5) MLsResponsible5 was .297 with S.E. =.143 and p<.05.

Table 21.
Coefficients

Model		Unstandardized Coefficients β	Std. Error	Standardized Coefficients Beta	t	Sig.
9	(Constant)	-.478	.138		-3.475	<.001
	TrainingSupport	.257	.063	.233	4.048	<.001
	MLsResponsible1	.431	.112	.220	3.831	<.001
	Need2	-.402	.113	-.202	-3.560	<.001
	LangAssistance9	-.436	.136	-.190	-3.201	.002
	LangAsistance2	.340	.118	.173	2.881	.004
	Need13	-.529	.146	-.206	-3.634	<.001
	LangAssistance5	.362	.143	.147	2.531	.012
	Billingual	-.143	.066	-.123	-2.180	.031
	MLsResponsible5	.297	.143	.120	2.074	.039

According to ANOVA table below for KNf2, the model 1 has TrainingSupport, model 2 has TrainingSupport and MLsResponsible1, the model 3 has TrainingSupport, MLsResponsible1, Need2, the model 4 has TrainingSupport, MLsResponsible1, Need2, and LangAssistance9, the model 5 has TrainingSupport, MLsResponsible1, Need2, LangAssistance9, LangAsistance2, the model 6 has TrainingSupport, MLsResponsible1, Need2, LangAssistance9, LangAsistance2, and Need13, the model 7 has TrainingSupport, MLsResponsible1, Need2, LangAssistance9, LangAsistance2, Need13, and LangAssistance5, the model, the model 8 has TrainingSupport, MLsResponsible1, Need2, LangAssistance9, LangAsistance2, Need13, LangAssistance5, Bilingual. All models included are statistically significant. All models are significantly useful in explaining KNF2. I selected the model 9 which is statistically significant and, F (9, 186) = 17.391, p < .05 (see Table 22).

Table 22.
ANOVA for KNf2

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	23.764	1	23.764	31.861	<.001[b]
	Residual	137.986	185	.746		
	Total	161.749	186			
2	Regression	38.118	2	19.059	28.366	<.001[c]
	Residual	123.631	184	.672		
	Total	161.749	186			
3	Regression	48.955	3	16.318	26.475	<.001[d]
	Residual	112.794	183	.616		
	Total	161.749	186			
4	Regression	58.967	4	14.742	26.103	<.001[e]
	Residual	102.783	182	.565		
	Total	161.749	186			
5	Regression	63.833	5	12.767	23.599	<.001[f]
	Residual	97.917	181	.541		
	Total	161.749	186			
6	Regression	68.776	6	11.463	22.192	<.001[g]
	Residual	92.973	180	.517		
	Total	161.749	186			
7	Regression	71.581	7	10.226	20.300	<.001[h]
	Residual	90.169	179	.504		
	Total	161.749	186			
8	Regression	73.822	8	9.228	18.681	<.001[i]
	Residual	87.927	178	.494		
	Total	161.749	186			
9	Regression	75.909	9	8.434	17.391	<.001[j]
	Residual	85.840	177	.485		
	Total	161.749	186			

To sum up, the model 9 has TrainingSupport, MLsResponsible1, Need2, LangAssistance9, LangAsistance2, Need13, LangAssistance5, Billingual, MLsResponsible5. explained the KNf2: Systematic school and district resources available for teachers of MLs to support for identification and placement. As it is mentioned before, approximately 44% of KNf2 was explained by predictors listed above.

The Variance Inflation Factor (VIF) measures the impact of collinearity among the variables in the regression model. VIF is 1/Tolerance, it is always greater than or equal to 1. Values of VIF that exceed 10 are often regarded as indicating multicollinearity. The value of tolerance should be > 0.1 (or VIF < 10) for all variables, which they are. The collinearity table 23 below showed that the VIFs range from 1 to 1.206. Especially I checked the model 9, the VIF and tolerance values are good (see Table 23).

Table 23.
Collinearity

Model		Tolerance	VIF
1	(Constant)		
	TrainingSupport	1.000	1.000
2	(Constant)		
	TrainingSupport	.978	1.023
	MLsResponsible1	.978	1.023
3	(Constant)		
	TrainingSupport	.967	1.034
	MLsResponsible1	.976	1.024
	Need2	.986	1.014
4	(Constant)		
	TrainingSupport	.933	1.072
	MLsResponsible1	.966	1.035
	Need2	.986	1.014
	LangAssistance9	.949	1.054
5	(Constant)		
	TrainingSupport	.924	1.082
	MLsResponsible1	.946	1.057
	Need2	.985	1.015
	LangAssistance9	.890	1.124
	LangAsistance2	.885	1.130
6	(Constant)		
	TrainingSupport	.923	1.084
	MLsResponsible1	.945	1.058
	Need2	.952	1.050
	LangAssistance9	.883	1.132

Table 23 (cont'd)

	LangAsistance2	.875	1.143
	Need13	.949	1.054
7	(Constant)		
	TrainingSupport	.908	1.102
	MLsResponsible1	.944	1.059
	Need2	.939	1.065
	LangAssistance9	.860	1.162
	LangAsistance2	.873	1.145
	Need13	.943	1.060
	LangAssistance5	.923	1.084
8	(Constant)		
	TrainingSupport	.905	1.105
	MLsResponsible1	.944	1.060
	Need2	.939	1.065
	LangAssistance9	.858	1.166
	LangAsistance2	.873	1.146
	Need13	.934	1.071
	LangAssistance5	.901	1.110
	Billingual	.947	1.056
9	(Constant)		
	TrainingSupport	.902	1.109
	MLsResponsible1	.912	1.097
	Need2	.934	1.071
	LangAssistance9	.849	1.178
	LangAsistance2	.829	1.206
	Need13	.933	1.072
	LangAssistance5	.895	1.118
	Billingual	.947	1.056
	MLsResponsible5	.890	1.124

Regression analysis when KNf3 (i.e., District and school level supports available at administrator level) is dependent variable

According to stepwise regression analysis below, there exist seven models all of which are significant results. The Model 8 as a set, showed that the eight variables: (1) MLsResponsible1 (In your school, which staff members are primarily responsible for the education of MLs? – MLs teacher), (2) MLsResponsible5 (In your school, which staff members are primarily responsible for the education of MLs? – MLs teacher assistant), (3) TrainingSupport (Has your training on MLs helped you better support all of your students (both MLs and non-MLs)?, (4) Need11 (What would you need to know more about in order to better serve the educational and developmental needs of MLs? –The ways that I can use the cultural and linguistic resources of MLs to teach my English monolingual students about another language or culture), (5) Training, (6) Need8 (What would you need to know more about in order to better serve the educational and developmental needs of MLs? –Finding appropriate resources to support the education of MLs), (7) HaveMLs, and (8) LangAssistance6 (In your school, which Language Assistance Programs are currently used? – Collaborative ESL and general).

The eight variables accounted for significant variation, R-square=.346, F (1,178) = 4.317, p< .05. The R-square for the model 1 was .115. The predictors explain the approximately 11% of the KNf3 in the model 1. In the second model, the R-square change was .170. So, with the model to approximately 5% more was explained when MLsResponsible5 added near MLsResponsible1 predictor. Similarly, the R-square change from model 2 to 3 is approximately 5%, so 22% of KNf3 is explained. Additionally, the R-square change was approximately 3% from model 3 to model 4 (see Table 24). The R-square changes approximately 3% from model 4 to model 5 and 3% from model 5 to model 6. In model 6, approximately 31% of KNf3 was explained by MLsResponsible1, MLsResponsible5, TrainingSupport, Need11, Training, Need8. In model 7, approximately 33% of KNf3 was explained by MLsResponsible1, MLsResponsible5, TrainingSupport, Need11, Training, Need8, and HaveMLs. Finally, in model 8, approximately 35% of KNf3 was explained by MLsResponsible1, MLsResponsible5, TrainingSupport, Need11, Training, Need8, HaveMLs, and LangAssistance6. These increments all happened statistically significant way.

Table 24.
Model summary

	R	R Square	Adjusted R Square	Std Err	R Square Change	F Change	df1	df2	Sig F Change
1	.339[a]	.115	.110	.89734900	.115	24.076	1	185	<.001
2	.412[b]	.170	.161	.87153081	.055	12.123	1	184	<.001
3	.468[c]	.219	.206	.84753450	.049	11.567	1	183	<.001
4	.499[d]	.249	.232	.83351731	.030	7.207	1	182	.008
5	.532[e]	.283	.264	.81639078	.035	8.716	1	181	.004
6	.560[f]	.313	.290	.80154185	.030	7.768	1	180	.006
7	.574[g]	.330	.304	.79393603	.017	4.465	1	179	.036
8	.588[h]	.346	.316	.78668059	.016	4.317	1	178	.039

h. Predictors: MLsResponsible1

i. Predictors: MLsResponsible1, MLsResponsible5

j. Predictors: MLsResponsible1, MLsResponsible5, TrainingSupport

k. Predictors: MLsResponsible1, MLsResponsible5, TrainingSupport, Need11

l. Predictors: MLsResponsible1, MLsResponsible5, TrainingSupport, Need11, Training

m. Predictors: MLsResponsible1, MLsResponsible5, TrainingSupport, Need11, Training, Need8

n. Predictors: MLsResponsible1, MLsResponsible5, TrainingSupport, Need11, Training, Need8, HaveMLs

o. Predictors: MLsResponsible1, MLsResponsible5, TrainingSupport, Need11, Training, Need8, HaveMLs, LangAssistance6

On one hand (see Table 25), in Model 8, for KNf3, the β values for Need11, Traning, Need8, and HavingMLs were negative and significant. β for (1) Need11 was -.418 with S.E.=.128, and p<.05, (2) Training was -.749 with S.E. =.238 and p<.05, (3) Need8 was -.360 with S.E. =.122 and p<.05, and (4) HavingMLs was -.552 with S.E. =.255. On the other hand, the B values for MLsResponsible1, MLsResponsible5, TraningSupport, and LangAssistance6 were positive and significant. B for (1) MLsResponsible1 was .506 with S.E.=.131 and p<.05, (2) MLsResponsible5 was .682 with S.E. =.157 and p<.05, (3) TrainingSupport was .555 with S.E. =.126 and p<.05, and (4) LangAssistance6 was .360 with S.E. =.173 and p<.05.

Table 25.
Coefficients

Model		Unstandardized Coefficients β	Std. Error	Standardized Coefficients Beta	t	Sig.
8	(Constant)	1.470	.556		2.642	.009
	MLsResponsible1	.506	.131	.253	3.870	<.001
	MLsResponsible5	.682	.157	.271	4.343	<.001
	TrainingSupport	.555	.126	.494	4.414	<.001
	Need11	-.418	.128	-.202	-3.257	.001
	Training	-.749	.238	-.356	-3.144	.002
	Need8	-.360	.122	-.186	-2.949	.004
	HaveMLs	-.552	.255	-.138	-2.163	.032
	LangAssistance6	.360	.173	.133	2.078	.039

According to ANOVA table below (see table 26) for KNf3, the model 1 has MLsResponsible1, model 2 has MLsResponsible1, MLsResponsible5, the model 3 has MLsResponsible1, MLsResponsible5, and TrainingSupport, the model 4 has MLsResponsible1, MLsResponsible5, TrainingSupport, and Need11, the model 5 has MLsResponsible1, MLsResponsible5, TrainingSupport, Need11, and Training, the model 6 has MLsResponsible1, MLsResponsible5, TrainingSupport, Need11, Training, and Need8, and the model 7 has MLsResponsible1, MLsResponsible5, TrainingSupport, Need11, Training, Need8, and HaveMLs. All models included are statistically significant. All models are significantly useful in explaining KNf3. I selected the model 8 which is statistically significant and, F (8, 186) = 11.755, $p < .05$.

Table 26.
ANOVA for KNf3

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	19.386	1	19.386	24.076	<.001[b]
	Residual	148.969	185	.805		
	Total	168.355	186			
2	Regression	28.595	2	14.297	18.823	<.001[c]

Table 26 (cont'd)

	Residual	139.760	184	.760		
	Total	168.355	186			
3	Regression	36.903	3	12.301	17.125	<.001[d]
	Residual	131.452	183	.718		
	Total	168.355	186			
4	Regression	41.910	4	10.478	15.081	<.001[e]
	Residual	126.445	182	.695		
	Total	168.355	186			
5	Regression	47.720	5	9.544	14.320	<.001[f]
	Residual	120.635	181	.666		
	Total	168.355	186			
6	Regression	52.710	6	8.785	13.674	<.001[g]
	Residual	115.644	180	.642		
	Total	168.355	186			
7	Regression	55.525	7	7.932	12.584	<.001[h]
	Residual	112.830	179	.630		
	Total	168.355	186			
8	Regression	58.197	8	7.275	11.755	<.001[i]
	Residual	110.158	178	.619		
	Total	168.355	186			

To sum up, the model 8 has MLsResponsible1, MLsResponsible5, TrainingSupport, Need11, Training, Need8, HaveMLs, and LangAssistance6 as predictors. As it is mentioned before, approximately 45% of KNf3 was explained by predictors listed above. The Variance Inflation Factor (VIF) measures the impact of collinearity among the variables in the regression model. VIF is 1/Tolerance, it is always greater than or equal to 1. Values of VIF that exceed 10 are often regarded as indicating multicollinearity. The value of tolerance should be > 0.1 (or VIF < 10) for all variables, which they are. The collinearity table 27 below showed that the VIFs range from 1 to 3.480. Especially I checked the model 8, the VIF and tolerance values are good (see Table 27).

Table 27.
Collinearity

Model		Tolerance	VIF
1	(Constant)		

Table 27 (cont'd)

2	(Constant)		
	MLsResponsible1	.957	1.045
	MLsResponsible5	.957	1.045
3	(Constant)		
	MLsResponsible1	.935	1.070
	MLsResponsible5	.956	1.046
	TrainingSupport	.977	1.024
4	(Constant)		
	MLsResponsible1	.921	1.086
	MLsResponsible5	.956	1.046
	TrainingSupport	.977	1.024
	Need11	.983	1.017
5	(Constant)		
	MLsResponsible1	.918	1.089
	MLsResponsible5	.956	1.046
	TrainingSupport	.297	3.371
	Need11	.970	1.031
	Training	.295	3.387
6	(Constant)		
	MLsResponsible1	.915	1.093
	MLsResponsible5	.947	1.055
	TrainingSupport	.297	3.372
	Need11	.968	1.033
	Training	.291	3.440
	Need8	.938	1.066
7	(Constant)		
	MLsResponsible1	.913	1.096
	MLsResponsible5	.946	1.057
	TrainingSupport	.296	3.375
	Need11	.956	1.046
	Training	.287	3.480
	Need8	.927	1.078
	HaveMLs	.900	1.111
8	(Constant)		
	MLsResponsible1	.861	1.161
	MLsResponsible5	.945	1.058

Table 27 (cont'd)

Need11	.956	1.046
Training	.287	3.480
Need8	.925	1.081
HaveMLs	.900	1.111
LangAssistance6	.894	1.118

Regression analysis when KNf4 (i.e., Data driven decision making about curriculum and instruction for MLs) is dependent variable

According to stepwise regression analysis below, there exist four models all of which are significant results. The Model 4 as a set, showed that the eight variables: (1) TrainingSupport (Has your training on MLs helped you better support all of your students (both MLs and non-MLs)?, (2) LangAsistance2 (In your school, which Language Assistance Programs are currently used? – English as Second Language (ESL) pull-in), (3) LangAssistance5 (In your school, which Language Assistance Programs are currently used? – Sheltered Content Instruction), and (4) MLsResponsible2 (In your school, which staff members are primarily responsible for the education of MLs? – assistant principals) (See Table 28). The four variables accounted for significant variation, R-square=.263, $F(1,182) = 4.402$, $p < .05$. The R-square for the model 1 was .140. The predictors explain the approximately 14% of the KNf4 in the model 1. In the second model, the R-square change was .063. So, with the model to approximately 6% more was explained. Similarly, the R-square change from model 2 to 3 is approximately 4%, so 24% of KNf4 is explained. Additionally, the R-square change was approximately 2% from model 3 to model 4. In model 4, approximately 26% of KNf4 was explained by TrainingSupport, LangAsistance2, LangAssistance5, and MLsResponsible2. These increments all happened statistically significant way.

Table 28.
Model summary

	R	R Square	Adjusted R Square	Std Err	R Square Change	F Change	df1	df2	Sig F Change
1	.375[a]	.140	.136	.88817356	.140	30.218	1	185	<.001
2	.451[b]	.203	.195	.85740622	.063	14.515	1	184	<.001
3	.495[c]	.245	.233	.83697281	.042	10.094	1	183	.002
4	.513[d]	.263	.247	.82929905	.018	4.402	1	182	.037

a. Predictors: (Constant), TrainingSupport
b. Predictors: (Constant), TrainingSupport, LangAsistance2
c. Predictors: (Constant), TrainingSupport, LangAsistance2, LangAssistance5
d. Predictors: (Constant), TrainingSupport, LangAsistance2, LangAssistance5, MLsResponsible2

In Model 4 (see Table 29), for KNf4, the B values for TrainingSupport, LangAsistance2, LangAssistance5, and MLsResponsible2 were positive and significant. B for (1) TrainingSupport was .332 with S.E.=.074, and p<.05, (2) LangAsistance2 was .444 with S.E. =.131 and p<.05, (3) LangAssistance5 was .478 with S.E. =.166 and p<.05, and (4) MLsResponsible2 was .736 with S.E. =.351 and p<.05.

Table 29.
Coefficients

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
4	(Constant)	-.689	.117		-5.893	<.001
	TrainingSupport	.332	.074	.294	4.496	<.001
	LangAsistance2	.444	.131	.221	3.387	<.001
	LangAssistance5	.478	.166	.189	2.882	.004
	MLsResponsible2	.736	.351	.136	2.098	.037

According to ANOVA table below (see Table 30) for KNf4, the model 1 has TrainingSupport model 2 has TrainingSupport and LangAsistance2, and the model 3 has

TrainingSupport, LangAsistance2, and LangAssistance5. All models are significantly useful in explaining KNf3. I selected the model 8 which is statistically significant and, F (8, 186) = 11.755, $p < .05$.

Table 30.
ANOVA for KNf4

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	19.386	1	19.386	24.076	<.001[b]
	Residual	148.969	185	.805		
	Total	168.355	186			
2	Regression	28.595	2	14.297	18.823	<.001[c]
	Residual	139.760	184	.760		
	Total	168.355	186			
3	Regression	36.903	3	12.301	17.125	<.001[d]
	Residual	131.452	183	.718		
	Total	168.355	186			
4	Regression	41.910	4	10.478	15.081	<.001[e]
	Residual	126.445	182	.695		
	Total	168.355	186			
5	Regression	47.720	5	9.544	14.320	<.001[f]
	Residual	120.635	181	.666		
	Total	168.355	186			
6	Regression	52.710	6	8.785	13.674	<.001[g]
	Residual	115.644	180	.642		
	Total	168.355	186			
7	Regression	55.525	7	7.932	12.584	<.001[h]
	Residual	112.830	179	.630		
	Total	168.355	186			
8	Regression	58.197	8	7.275	11.755	<.001[i]
	Residual	110.158	178	.619		
	Total	168.355	186			

To sum up, the model 4 has TrainingSupport, LangAsistance2, LangAssistance5, and MLsResponsible2 as predictors. As it is mentioned before, approximately 26% of KNf4 was explained by predictors listed above. The Variance Inflation Factor (VIF) measures the impact of collinearity among the variables in the regression model. VIF is 1/Tolerance, it is always greater than or equal to 1. Values of VIF that exceed 10 are often regarded as indicating multicollinearity. The value of tolerance should be > 0.1 (or VIF < 10) for all variables, which they are. The collinearity table 31 below showed that the VIFs range from 1 to 1061. Especially I checked the model 4, the VIF and tolerance values are good (see Table 31).

Table 31.
Collinearity

Model		Collinearity Statistics Tolerance	VIF
1	(Constant)		
	TrainingSupport	1.000	1.000
2	(Constant)		
	TrainingSupport	.971	1.030
	LangAsistance2	.971	1.030
3	(Constant)		
	TrainingSupport	.947	1.056
	LangAsistance2	.962	1.039
	LangAssistance5	.961	1.041
4	(Constant)		
	TrainingSupport	.946	1.057
	LangAsistance2	.952	1.050
	LangAssistance5	.942	1.061
	MLsResponsible2	.963	1.039

Regression analysis when KNf5 (i.e., Teachers' willingness to work with MLs) is dependent variable

According to stepwise regression analysis below, there exist seven models all of which are significant results. The Model 6 as a set, showed that the six variables: TrainingSupport (Has your training on MLs helped you better support all of your students (both MLs and non-MLs)?), Need11 (What would you need to know more about in order to better serve the educational and developmental needs of MLs? –), LangAssistance9 (In your school, which Language Assistance Programs are currently used? –I do not know), MLsResponsible1 (In your school, which staff members are primarily responsible for the education of MLs? – MLs teacher), Need12 (What would you need to know more about in order to better serve the educational and developmental needs of MLs? – the history, culture, and arts of ML students' home culture), and Need3 (What would you need to know more about in order to better serve the educational and developmental needs of MLs? – Monitoring the English proficiency levels of MLs).

The six variables accounted for significant variation, R-square=.236, F (1,180) = 4.748, p< .05. The R-square for the model 1 was .264. The predictors explain the approximately 26% of the KNf5 in the model (see Table 32) 1. In the second model, the R-square change was .364. Similarly, the R-square change from model 2 to 3 is approximately 6%. Additionally, the R-square change was approximately 3% from model 3 to model 4. The R-square changes approximately 2% from model 4 to model 5 and 2% from model 5 to model 6. In model 6, approximately 23% of KNf5 was explained by TrainingSupport, Need11, LangAssistance9, MLsResponsible1, Need12,and Need. These increments all happened statistically significant way. Model 6. The increment in variation accounted for is statistically significant, F (1,180) =4.748, p<.05.

Table 32.
Model summary

	R	R Square	Adjusted R Square	Std Err	R Square Change	F Change	df1	df2	Sig F Change
1	.264[a]	.070	.065	.93155987	.070	13.887	1	185	.264[a]
2	.364[b]	.133	.123	.90202501	.063	13.313	1	184	.364[b]
3	.409[c]	.167	.153	.88637843	.034	7.553	1	183	.409[c]
4	.438[d]	.192	.174	.87545882	.025	5.594	1	182	.438[d]
5	.464[e]	.215	.194	.86494481	.024	5.452	1	181	.464[e]
6	.485[f]	.236	.210	.85612710	.020	4.748	1	180	.485[f]

a. Predictors: TrainingSupport
b. Predictors: TrainingSupport, Need11
c. Predictors: TrainingSupport, Need11, LangAss9
d. Predictors: TrainingSupport, Need11, LangAss9, MlsResponsible1
e. Predictors: TrainingSupport, Need11, LangAss9, MlsResponsible1, Need12

Table 32 (cont'd)

f. Predictors: (Constant), TrainingSupport, Need11, LangAssistance9, MlsResponsible1, Need12, Need3

On one hand, in Model 6 (see Table 33), for KNf1, the B values for LangAssistance9 Need3 were negative and significant. B for (1) LangAssistance9 was -.404 with S.E.=.159, and $p<.05$ and (2) Need3 was -.321 with S.E. =.147 and $p<.05$. On the other hand, the B values for TrainingSupport, Need11, MLsResponsible1, and Need12 were positive and significant. B for (1) TrainingSupport was .215 with S.E.=.077 and $p<.05$, (2) Need11 was .430 with S.E. =.150 and $p<.05$, (3) MLsResponsible1 was .323 with S.E. =.135 and $p<.05$, and (4) Need12 was .378 with S.E. =.147 and $p<.05$.

Table 33.
Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
6	(Constant)	-.641	.165		-3.886	<.001
	TrainingSupport	.215	.077	.189	2.805	.006
	Need11	.430	.150	.205	2.857	.005
	LangAssistance9	-.404	.159	-.171	-2.547	.012
	MLsResponsible1	.323	.135	.160	2.386	.018
	Need12	.378	.138	.197	2.749	.007
	Need3	-.321	.147	-.150	-2.179	.031

According to ANOVA table below (see Table 34) for KNf5, the model one has TrainingSupport, model 2 has TrainingSupport, Need11, the model 3 has TrainingSupport, Need11, LangAssistance9, the model 4 has TrainingSupport, Need11, LangAssistance9, and MLsResponsible1. The model 5 has TrainingSupport, Need11, LangAssistance9, MLsResponsible1, and Need12. All models included are statistically significant. All models are significantly useful in explaining KNF5. I selected the model 7 which is statistically significant and, F (6, 186) = 9.246, $p < .05$.

Table 34.
ANOVA for KNf5

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12.051	1	12.051	13.887	<.001[b]
	Residual	160.544	185	.868		
	Total	172.595	186			
2	Regression	22.884	2	11.442	14.062	<.001[c]
	Residual	149.711	184	.814		
	Total	172.595	186			
3	Regression	28.818	3	9.606	12.227	<.001[d]
	Residual	143.777	183	.786		
	Total	172.595	186			
4	Regression	33.105	4	8.276	10.798	<.001[e]
	Residual	139.490	182	.766		
	Total	172.595	186			
5	Regression	37.184	5	7.437	9.940	<.001[f]
	Residual	135.411	181	.748		
	Total	172.595	186			
6	Regression	40.663	6	6.777	9.246	<.001[g]
	Residual	131.932	180	.733		
	Total	172.595	186			

a. Dependent Variable: KNf5
b. Predictors: (Constant), TrainingSupport
c. Predictors: (Constant), TrainingSupport, Need11
d. Predictors: (Constant), TrainingSupport, Need11, LangAssistance9
e. Predictors: (Constant), TrainingSupport, Need11, LangAssistance9, MLsResponsible1
f. Predictors: (Constant), TrainingSupport, Need11, LangAssistance9, MLsResponsible1, Need12
g. Predictors: (Constant), TrainingSupport, Need11, LangAssistance9, MLsResponsible1, Need12, Need3

To sum up, predictors TrainingSupport, Need11, LangAssistance9, MLsResponsible1, Need12, and Need3 as predictors. explained the KNf5. As it is mentioned before, approximately 24% of KNf5 was explained by predictors listed above.

The Variance Inflation Factor (VIF) measures the impact of collinearity among the variables in the regression model. VIF is 1/Tolerance, it is always greater than or equal to 1. Values of VIF that exceed 10 are often regarded as indicating multicollinearity. The value of tolerance should be > 0.1 (or VIF < 10) for all variables, which they are. The collinearity table 35 below showed that the VIFs range from 1 to 1.208. Especially I checked the model 6, the VIF and tolerance values are good (see Table 35).

Table 35.
Collinearity

		Collinearity Statistics	
Model		Tolerance	VIF
1	(Constant)		
	TrainingSupport	1.000	1.000
2	(Constant)		
	TrainingSupport	1.000	1.000
	Need11	1.000	1.000
3	(Constant)		
	TrainingSupport	.959	1.043
	Need11	.995	1.005
	LangAssistance9	.955	1.047
4	(Constant)		
	TrainingSupport	.944	1.059
	Need11	.977	1.024
	LangAssistance9	.943	1.061
	MLsResponsible1	.950	1.053
5	(Constant)		
	TrainingSupport	.944	1.060
	Need11	.846	1.181
	LangAssistance9	.943	1.061
	MLsResponsible1	.950	1.053
	Need12	.863	1.159
6	(Constant)		
	TrainingSupport	.931	1.074
	Need11	.826	1.210
	LangAssistance9	.942	1.061
	MLsResponsible1	.949	1.053
	Need12	.828	1.208
	Need3	.891	1.122

Regression analysis when KNf6 (i.e., Teachers' need for PD to support for culturally responsive teaching and support MLs' learning and engagement)

According to stepwise regression analysis below, there exist only one model which has significant results. The Model 1 as a set, showed that the 1 variable: Need11 (What would you need to know more about in order to better serve the educational and developmental needs of MLs? – ways that I can use the cultural and linguistic resources of MLs to teach my English monolingual students about another language or culture) (see Table 36)The one variable accounted for significant variation, R-square=.037 F (1,185) = 7.206, p< .05. Need11 explains approximately 4% of KNf6 significantly.

Table 36.
Model summary

	R	R Square	Adjusted R Square	Std Err	R Square Change	F Change	df1	df2	Sig F Change
1	.194	.037	.032	.95020408	.037	7.206	1	185	.008
a. Predictors: (Constant), Need11									

On one hand, in Model 1, for KNf6, the B values for Need11 was positive and significant. B for Need11 was .407 with S.E.=.152 and p<.05 (see Table 37).

Table 37.
Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-.116	.083		-1.392	.166
	Need11	.407	.152	.194	2.684	.008

According to ANOVA table below (see Table 38) for KNf6, the model one has Need11. The model is statistically significant. It is significantly useful in explaining KNF6, F (1, 186) = 7.206, $p < .05$.

Table 38.
ANOVA for KNf6

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.506	1	6.506	7.206	.008[b]
	Residual	167.034	185	.903		
	Total	173.540	186			

To sum up, predictor Need11 explained the KNf6. As it is mentioned before, approximately 4% of KNf6 was explained by predictors listed above. The Variance Inflation Factor (VIF) measures the impact of collinearity among the variables in the regression model. VIF is 1/Tolerance, it is always greater than or equal to 1. Values of VIF that exceed 10 are often regarded as indicating multicollinearity. The value of tolerance should be > 0.1 (or VIF < 10) for all variables, which they are. The collinearity table 39 below showed that the VIFs, so the VIF and tolerance values are good (see Table 39).

Table 39.
Collinearity

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	TrainingSupport	1.000	1.000
2	(Constant)		
	TrainingSupport	1.000	1.000
	Need11	1.000	1.000
3	(Constant)		
	TrainingSupport	.959	1.043
	Need11	.995	1.005
	LangAssistance9	.955	1.047
4	(Constant)		

Table 39 (cont'd)

	TrainingSupport	.944	1.059
	Need11	.977	1.024
	LangAssistance9	.943	1.061
	MLsResponsible1	.950	1.053
	(Constant)		
5	TrainingSupport	.944	1.060
	Need11	.846	1.181
	LangAssistance9	.943	1.061
	MLsResponsible1	.950	1.053
	Need12	.863	1.159
6	(Constant)		
	TrainingSupport	.931	1.074
	Need11	.826	1.210
	LangAssistance9	.942	1.061
	MLsResponsible1	.949	1.053
	Need12	.828	1.208
	Need3	.891	1.122

Regression analysis when KNf7 (i.e., Teachers' Beliefs about language acquisition (bilingualism and translanguaging) dependent variable

According to stepwise regression analysis below, there exist three models all of which are significant results. The Model 3 as a set, showed that the three variables: Need11 (What would you need to know more about in order to better serve the educational and developmental needs of MLs? – ways that I can use the cultural and linguistic resources of MLs to teach my English monolingual students about another language or culture), MLsResponsible4 (In your school, which staff members are primarily responsible for the education of MLs? – general teacher education), TrainingSupport (Has your training on MLs helped you better support all of your students (both MLs and non-MLs)?) (See Table 40). The three variables accounted for significant variation, R-square=.099, F (1,183) = 4.366, p< .05. The R-square for the model 1 was .041. The predictors explain the approximately 4% of the KNf7 in the model 1. In the second model, the R-square change was .036. Similarly, the R-square change from model 2 to 3 is approximately 2%. In model 3, approximately 31% of KNf7 was explained by Need11, MLsResponsible4, and TrainingSupport. These increments all happened statistically significant way. In model 3, the increment in variation accounted for is statistically significant, F (1,183) =4.366, p<.05.

Table 40.
Model summary

	R	R Square	Adjusted R Square	Std Err	R Square Change	F Change	df1	df2	Sig F Change
1	.203[a]	.041	.036	.88486653	.041	7.934	1	185	.005
2	.277[b]	.077	.067	.87051336	.036	7.151	1	184	.008
3	.314[c]	.099	.084	.86265873	.022	4.366	1	183	.038

a. Predictors: (Constant), Need11
b. Predictors: (Constant), Need11, MLsResponsible4
c. Predictors: (Constant), Need11, MLsResponsible4, TrainingSupport

On one hand, in Model 3 (see Table 41), for KNf7, the B values for Need11, MLsResponsible, and TrainingSupport were negative and significant. B for (1) Need11 was -.409 with S.E.=.138, and p<.05 and (2) MLsResponsible was -.346 with S.E.=.142 and p<.05, and (3) TrainingSupport was -.157 with S.E.= .075 and p<.05.

Table 41.
Coefficients

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
3	(Constant)	.576	.155		3.713	<.001
	Need11	-.409	.138	-.208	-2.966	.003
	MLsResponsible4	-.346	.142	-.172	-2.436	.016
	TrainingSupport	-.157	.075	-.148	-2.089	.038

According to ANOVA table below (see Table 42) for KNf7, the model one has Need11. The model 2 has Need11 and MLsResponsible4. The model 3 has Need11, MLsResponsible4, and TrainingSupport. All models are significantly useful in explaining KNF7, but I selected the model 3 which is statistically significant and, F (3, 186) = 6.665, $p < .05$

Table 42.
ANOVA for KNf7

Model		Sum of square	df	Mean Square	F	Sig.
1	Regression	6.213	1	6.213	7.934	.005[b]
	Residual	144.853	185	.783		
	Total	151.065	186			
2	Regression	11.631	2	5.816	7.675	<.001[c]
	Residual	139.434	184	.758		
	Total	151.065	186			
3	Regression	14.880	3	4.960	6.665	<.001[d]
	Residual	136.185	183	.744		
	Total	151.065	186			

a. Predictors: (Constant), Need11
b. Predictors: (Constant), Need11, MLsResponsible4
c. Predictors: (Constant), Need11, MLsResponsible4, TrainingSupport

To sum up, predictors TrainingSupport, Need11, and MLsResponsible4 as predictors. explained the KNf7. As it is mentioned before, approximately 10% of KNf7 was explained by predictors listed above. The Variance Inflation Factor (VIF) measures the impact of collinearity among the variables in the regression model. VIF is 1/Tolerance, it is always greater than or equal to 1. Values of VIF that exceed 10 are often regarded as indicating multicollinearity. The value of tolerance should be > 0.1 (or VIF < 10) for all variables, which they are. The collinearity table 43 below showed that the VIFs range from 1 to 1.015. Especially I checked the model 3, the VIF and tolerance values are good (see Table 43).

Table 43.
Collinearity

	Collinearity Statistics

Table 43 (cont'd)

Model		Tolerance	VIF
1	(Constant)		
	Need11	1.000	1.000
2	(Constant)		
	Need11	.999	1.001
	MLsResponsible4	.999	1.001
3	(Constant)		
	Need11	.999	1.001
	MLsResponsible4	.985	1.015
	TrainingSupport	.986	1.014

Regression analysis when Rhf1 (i.e., Establishing inclusion) is dependent variable

According to stepwise regression analysis below, there exist three models all of which are significant results. The Model 7 as a set, showed that the seven variables: (1) Need8 (What would you need to know more about in order to better serve the educational and developmental needs of MLs? – Making time for general education teachers to collaborate with ML teachers), (2) LangAssistance5, (3) LangAssistance9 (In your school, which Language Assistance Programs are currently used? –I do not know), (4) Need14 (In your school, which staff members are primarily responsible for the education of MLs? –Teaching the English language reading and language arts to pre-literate ML students]), (5) TrainingPlace4 Where did you receive your training? – In-district professional development), (6) WorkYear (How long have you worked in the field of mathematics education?), and (7) Need10 (In your school, which staff members are primarily responsible for the education of MLs? – The "tools" or instruments to identify students with limited/interrupted formal education (SLIFE)) (see Table 44). The seven variables accounted for significant variation, R-square=.252, F (1,179) = 4.330, p< .05. The R-square for the model 1 was .093. The predictors explain the approximately 9% of the Rhf1 in the model 1. In the second model, the R-square change was .052. Similarly, the R-square change from model

2 to 3 is approximately 3%. The R-square change from model 3 to 4 is approximately 2%, from model 4 to 5 is approximately 2%, from model 5 to 6 is approximately 2%, and from model 6 to 7 is approximately 2%. These increments all happened in a statistically significant way. In model 7, the increment in variation accounted for is statistically significant, F (1,179) =4.330, p<.05.

Table 44.
Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics: R Square Change	F Change	df1	df2	Sig. F Change
1	.305[a]	.093	.088	.95943978	.093	18.992	1	185	<.001
2	.382[b]	.146	.136	.93380391	.052	11.297	1	184	<.001
3	.416[c]	.173	.160	.92111119	.028	6.106	1	183	.014
4	.444[d]	.197	.179	.91037826	.024	5.340	1	182	.022
5	.465[e]	.216	.194	.90184051	.019	4.462	1	181	.036
6	.483[f]	.234	.208	.89414710	.018	4.128	1	180	.044
7	.502[g]	.252	.222	.88598838	.018	4.330	1	179	.039

a. Predictors: (Constant), Need8
b. Predictors: (Constant), Need8, LangAssistance5
c. Predictors: (Constant), Need8, LangAssistance5, LangAssistance9
d. Predictors: (Constant), Need8, LangAssistance5, LangAssistance9, Need14
e. Predictors: (Constant), Need8, LangAssistance5, LangAssistance9, Need14, TrainingPlace4
f. Predictors: (Constant), Need8, LangAssistance5, LangAssistance9, Need14, TrainingPlace4, WorkYear
g. Predictors: (Constant), Need8, LangAssistance5, LangAssistance9, Need14, TrainingPlace4, WorkYear, Need10

On one hand, in Model 7 (see Table 45), for Rhf1, the B values for Need8, LangAssinstance9, and Need10 were negative and significant. B for (1) Need8 was -.514 with S.E.=.137, and p<.05 and (2) LangAssinstance9 was -.367 with S.E.=.166 and p<.05, and (3) Need10 was -.285 with S.E.= .137 and p<.05. On the other hand, the B values for (1) LangAssistance5 is .524 with S.E.= .179, p<.05, (2) Need14 is .974 with S.E.= .457, p<.05, (3) TrainingPlace4 is .651 with S.E.= .281, p<.05, and (4) WorkYear is .127 with S.E.= .061, p<.05. All these results are significant.

Table 45.
Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
7	(Constant)	-.210	.296		-.710	.479
	Need8	-.514	.137	-.252	-3.758	<.001
	LangAssistance5	.524	.179	.197	2.928	.004
	LangAssistance9	-.367	.166	-.149	-2.210	.028
	Need14	.974	.457	.141	2.132	.034
	TrainingPlace4	.651	.281	.153	2.315	.022
	WorkYear	.127	.061	.136	2.086	.038
	Need10	-.285	.137	-.138	-2.081	.039

According to ANOVA table below (see Table 46) for Rhf1, the model one has Need8. The model 2 has Need8 and LangAssistance5. The model 3 has Need8, LangAssistance5, and LangAssistance9. The model 4 has Need8, LangAssistance5, LangAssistance9, and Need14. The model 5 has Need8, LangAssistance5, LangAssistance9, Need14, and TrainingPlace4. The model 6 has Need8, LangAssistance5, LangAssistance9, Need14, TrainingPlace4, and WorkYear All models are significantly useful in explaining Rhf1, but I selected the model 7 which is statistically significant and, F (7, 186) = 8.602, $p < .05$.

Table 46.
ANOVA for Rhf1

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	17.483	1	17.483	18.992	<.001[b]
Table 46 (cont'd)						
	Residual	170.297	185	.921		
	Total	187.780	186			
2	Regression	27.334	2	13.667	15.673	<.001[c]
	Residual	160.446	184	.872		
	Total	187.780	186			
3	Regression	32.514	3	10.838	12.774	<.001[d]
	Residual	155.266	183	.848		
	Total	187.780	186			
4	Regression	36.940	4	9.235	11.143	<.001[e]

Table 46 (cont'd)

	Residual	150.840	182	.829		
	Total	187.780	186			
5	Regression	40.569	5	8.114	9.976	<.001[f]
	Residual	147.210	181	.813		
	Total	187.780	186			
6	Regression	43.870	6	7.312	9.145	<.001[g]
	Residual	143.910	180	.799		
	Total	187.780	186			
7	Regression	47.269	7	6.753	8.602	
	Residual	140.511	179	.785		

To sum up, predictors Need8, LangAssistance5, LangAssistance9, Need14, TrainingPlace4, WorkYear, Need10 explained the Rhf1. As it is mentioned before, approximately 25% of Rhf1 was explained by predictors listed above. The Variance Inflation Factor (VIF) measures the impact of collinearity among the variables in the regression model. VIF is 1/Tolerance, it is always greater than or equal to 1. Values of VIF that exceed 10 are often regarded as indicating multicollinearity. The value of tolerance should be > 0.1 (or VIF < 10) for all variables, which they are. The collinearity table 47 below showed that the VIFs range from 1 to 1.083. Especially I checked the model 7, the VIF and tolerance values are good (see Table 47).

Table 47.
Collinearity

		Collinearity Statistics	
Model		Tolerance	VIF
1	(Constant)		
	Need8	1.000	1.000
2	(Constant)		
	Need8	.985	1.015
	LangAssistance5	.985	1.015
3	(Constant)		
	Need8	.968	1.033
	LangAssistance5	.952	1.050
	LangAssistance9	.944	1.059
4	(Constant)		

Table 47 (cont'd)

	Need8	.958	1.044
	LangAssistance5	.944	1.059
	LangAssistance9	.939	1.066
	Need14	.977	1.024
5	(Constant)		
	Need8	.935	1.069
	LangAssistance5	.942	1.062
	LangAssistance9	.936	1.068
	Need14	.976	1.025
	TrainingPlace4	.971	1.030
6	(Constant)		
	Need8	.935	1.070
	LangAssistance5	.941	1.063
	LangAssistance9	.929	1.077
	Need14	.976	1.025
	TrainingPlace4	.970	1.031
	WorkYear	.987	1.013
7	(Constant)		
	Need8	.932	1.072
	LangAssistance5	.924	1.083
	LangAssistance9	.925	1.082
	Need14	.961	1.041
	TrainingPlace4	.959	1.043
	WorkYear	.987	1.013
	Need10	.948	1.055

Regression analysis when Rhf2 (i.e., Encouraging autonomy and cultural awareness of students and collaborative decision making with all) is dependent variable

According to stepwise regression analysis below, there exist six models all of which are significant results. The Model 6 as a set, showed that the seven variables: (1) MLsClass, (2) Need11 (3) Need14, (4) Hispanic, (5) Need7, (6) TrainingPlace4 (see Table 48). The six variables accounted for significant variation, R-square=.262, F (1,180) = 4.391, p< .05. The predictors explain the approximately 26% of the Rhf2 in the model 6. In the first model, the R-square was .081. The R-square change from model 2 to 3 is approximately 7%. The R-square change from model 3 to 4 is approximately 4%, from model 4 to 5 is approximately 3%, from model 5 to 6 is approximately 2%. These increments all happened in a statistically significant way. In model 7, the increment in variation accounted for is statistically significant, F (1,180) = 4.391, p< .05.

Table 48.
Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.284[a]	.081	.076	.96406596	.081	16.235	1	185	<.001
2	.396[b]	.157	.147	.92588009	.076	16.575	1	184	<.001
3	.440[c]	.194	.180	.90779912	.037	8.403	1	183	.004
4	.474[d]	.224	.207	.89287173	.031	7.170	1	182	.008
5	.494[e]	.244	.223	.88365514	.020	4.816	1	181	.029
6	.512[f]	.262	.238	.87549185	.018	4.391	1	180	.038

a. Predictors: (Constant), MLsClass
b. Predictors: (Constant), MLsClass, Need11
c. Predictors: (Constant), MLsClass, Need11, Need14
d. Predictors: (Constant), MLsClass, Need11, Need14, Hispanic
e. Predictors: (Constant), MLsClass, Need11, Need14, Hispanic, Need7
f. Predictors: (Constant), MLsClass, Need11, Need14, Hispanic, Need7, TrainingPlace4

On one hand, in Model 6, for Rhf2, the B values for MLsClass, Need7, Hispanic, and Need8 were negative and significant (see Table 49). B for (1) MLsClass was -.499 with S.E.=.120, and p<.05 and (2) Hispanic was -.740 with S.E.=.281 and p<.05, and (3) Need7 was -.292 with S.E.= .134 and p<.05. On the other hand, the B values for (1) Need11 is .646 with S.E.= .148, p<.05, (2) Need14 is 1.377 with S.E.= .446, p<.05, (3) TrainingPlace4 is .581 with S.E.= .277, p<.05. All these results are significant.

Table 49.
Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		

Table 49 (cont'd)

6	(Constant)	1.498	.357		4.193	<.001
	MLsClass	-.499	.120	-.267	-4.160	<.001
	Need11	.646	.148	.296	4.374	<.001
	Need14	1.377	.446	.199	3.090	.002
	Hispanic	-.740	.281	-.169	-2.636	.009
	Need7	-.292	.134	-.144	-2.177	.031
	TrainingPlace4	.581	.277	.137	2.095	.038

According to ANOVA table (see Table 50) below for Rhf1, the model one has MLsClass. The model 2 has MLsClass and Need11. The model 3 has MLsClass, Need11s, Need11, and Need14. The model 4 has MLsClass, Need11, Need11, Need14, and Hispanic. The model 5 has MLsClass, Need11, Need14, Hispanic, and Need7. The model 6 has MLsClass, Need11, Need14, Hispanic, Need7, and TrainingPlace4. All models are significantly useful in explaining Rhf1, but I selected the model 6 which is statistically significant and, F (6, 186) = 10.669, $p <$ .05.

Table 50.
ANOVA for Rhf2

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	15.089	1	15.089	16.235	<.001[b]
	Residual	171.943	185	.929		
2	Regression	29.298	2	14.649	17.088	<.001[c]
	Residual	157.735	184	.857		
	Total	187.032	186			
3	Regression	36.222	3	12.074	14.651	<.001[d]
	Residual	150.810	183	.824		
	Total	187.032	186			
4	Regression	41.938	4	10.485	13.151	<.001[e]
	Residual	145.094	182	.797		
5	Regression	45.699	5	9.140	11.705	<.001[f]
	Residual	141.333	181	.781		
	Total	187.032	186			
6	Regression	49.065	6	8.177	10.669	<.001[g]
	Residual	137.967	180	.766		
	Total	187.032	186			

To sum up, predictors MLsClass, Need11, Need14, Hispanic, Need7, and TrainingPlace4 explained the Rhf1. As it is mentioned before, approximately 26% of Rhf2 was explained by predictors listed above. The Variance Inflation Factor (VIF) measures the impact of collinearity among the variables in the regression model. VIF is 1/Tolerance, it is always greater than or equal to 1. Values of VIF that exceed 10 are often regarded as indicating multicollinearity. The value of tolerance should be > 0.1 (or VIF < 10) for all variables, which they are. The collinearity table 51 below showed that the VIFs range from 1 to 1.068. Especially I checked the model 6, the VIF and tolerance values are good (See Table 51).

Table 51.
Collinearity

		Collinearity Statistics	
Model		Tolerance	VIF
1	(Constant)		
	MLsClass	1.000	1.000
2	(Constant)		
	MLsClass	1.000	1.000
	Need11	1.000	1.000
3	(Constant)		
	MLsClass	.996	1.004
	Need11	.990	1.010
	Need14	.987	1.013
4	(Constant)		
	MLsClass	.996	1.004
	Need11	.987	1.013
	Need14	.987	1.014
	Hispanic	.996	1.004
5	(Constant)		
	MLsClass	.996	1.004
	Need11	.925	1.081
	Need14	.987	1.014
	Hispanic	.996	1.004
	Need7	.936	1.068

Table 51 (cont'd)

6	(Constant)		
	MLsClass	.996	1.004
	Need11	.896	1.116
	Need14	.986	1.014
	Hispanic	.993	1.007
	Need7	.936	1.068
	TrainingPlace4	.963	1.039

Regression analysis when Rhf3 (i.e., Establishing trust and relationships) is dependent variable

According to stepwise regression analysis below, there exist three models all of which are significant results (see Table 52). The Model 2 as a set, showed that the seven variables: (1) TrainingSupport and (2) MLsResponsible3. The two variables accounted for significant variation, R-square=.252, F (1,179) = 4.330, p< .05. The R-square for the model 1 was .093. The predictors explain the approximately 9% of the Rhf1 in the model 1. In the second model, the R-square change was .078. The R-square change from model 1 to 2 is approximately 5%. The increment all happened in a statistically significant way. In model 2, the increment in variation accounted for is statistically significant, F (1,184) =4.330, p<.05.

Table 52.
Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.227[a]	.052	.046	.98015809	.052	10.066	1	185	.002
2	.279[b]	.078	.068	.96918055	.026	5.215	1	184	.024

a. Predictors: (Constant), TrainingSupport
b. Predictors: (Constant), TrainingSupport, MLsResponsible3

On one hand, in Model 2 (see Table 53), for Rhf3, the B value for MLsResponsible3 was negative and significant. B for MLsResponsible3 was -.919 with S.E.=.402, and p<.05. On the other hand, B value for TrainingSupport was positive and significant. B for TrainingSupport was .276 with S.E.=.084, and p<.05. All these results are significant.

Table 53.
Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
2	(Constant)	-.330	.133		-2.488	.014
	TrainingSupport	.276	.084	.233	3.289	.001
	MLsResponsible3	-.919	.402	-.162	-2.284	.024

According to ANOVA table below (see Table 54) for Rhf3, the model one has TraininSupport. The model 2 has TrainingSupport and MLsResponsible3. All models are significantly useful in explaining Rhf1, but I selected the model 7 which is statistically significant and, $F\ (2, 186) = 7.755,\ p < .05$.

Table 54.
ANOVA Rhf3

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9.670	1	9.670	10.066	.002[b]
	Residual	177.731	185	.961		
	Total	187.402	186			
2	Regression	14.568	2	7.284	7.755	<.001[c]
	Residual	172.833	184	.939		
	Total	187.402	186			

To sum up, predictors TrainingSupport and MLsResponsible3 explained the Rhf3. As it is mentioned before, approximately 8% of Rhf3 was explained by predictors listed above. The Variance Inflation Factor (VIF) measures the impact of collinearity among the variables in the regression model. VIF is 1/Tolerance, it is always greater than or equal to 1. Values of VIF that exceed 10 are often regarded as indicating multicollinearity. The value of tolerance should be > 0.1 (or VIF < 10) for all variables, which they are. The collinearity table 55 below showed that the VIFs range from 1 to 1.001. Especially I checked the model 2, the VIF and tolerance values are good (see Table 55).

Table 55.
Collinearity

Model		Tolerance	VIF
1	(Constant)		
	TrainingSupport	1.000	1.000
2	(Constant)		
	TrainingSupport	.999	1.001
	MLsResponsible3	.999	1.001

Regression analysis when Rhf4 (i.e., Providing transparent feedback and assessment) is dependent variable

According to stepwise regression analysis below, there exist three models all of which are significant results (see Table 56). The Model 5 as a set, showed that the seven variables: (1) Need2, (2) TrainingPlace4, (3) WorkYear, (4) TrainingPlace5, (5) MLsResponsible7. The five variables accounted for significant variation, R-square=.182, F (1,181) = 3.983, p< .05. The R-square for the model 1 was .066. The predictors explain the approximately 7% of the Rhf4 in the model 1. In the second model, the R-square change was .052. Similarly, the R-square change from model 2 to 3 is approximately 3%. The R-square change from model 3 to 4 is approximately 2%, from model 4 to 5 is approximately 4%. These increments all happened in a statistically significant way. In model 7, the increment in variation accounted for is statistically significant, F (1,181) = 3.983, p<.05.

Table 56.
Model summary

					Change Statistics				
Model	R	R Square	Adj. R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.256[a]	.066	.061	.97255660	.066	12.992	1	185	<.001
2	.343[b]	.118	.108	.94759937	.052	10.873	1	184	.001
3	.379[c]	.144	.130	.93617461	.026	5.518	1	183	.020
4	.405[d]	.164	.146	.92734170	.021	4.503	1	182	.035
5	.427[e]	.182	.160	.91983418	.018	3.983	1	181	.047

a. Predictors: (Constant), Need2

Table 56 (cont'd)

b. Predictors: (Constant), Need2, TrainingPlace4

c. Predictors: (Constant), Need2, TrainingPlace4, WorkYear

d. Predictors: (Constant), Need2, TrainingPlace4, WorkYear, TrainingPlace5

e. Predictors: (Constant), Need2, TrainingPlace4, WorkYear, TrainingPlace5, MLsResponsible7

On one hand, in Model 5 (see Table 57), for Rhf4, the B values for Need2 and TrainingPlace5 were negative and significant. B for (1) Need2 was -.468 with S.E.=.146, and p<.05 and (2) TrainingPlace5 was -.1.120 with S.E.=.542 and p<.05. On the other hand, the B values for (1) TrainingPlace4 was 1.010 with S.E.= .290, p<.05, (2) WorkYear was .163 with S.E.= .063, p<.05, (3) MLsResponsible was .714 with S.E.= .358, p<.05. All these results are significant.

Table 57.
Coefficients

		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
5	(Constant)	-.657	.293		-2.240	.026
	Need2	-.468	.146	-.218	-3.217	.002

Table 57 (cont'd)

TrainingPlace4	1.010	.290	.237	3.480	<.001
WorkYear	.163	.063	.175	2.573	.011
TrainingPlace5	-1.120	.542	-.141	-2.067	.040
MLsResponsible7	.714	.358	.135	1.996	.047

According to ANOVA table below for Rhf4, the model one has Need2. The model 2 has Need2 and TrainingPlace4. The model 3 has Need2, TrainingPlace4, and WorkYear. The model 4 has Need2, TrainingPlace4, WorkYear, and TrainingPlace5. The model 5 has Need2, TrainingPlace4, WorkYear, TrainingPlace5, and MLsResponsible7. All models are significantly useful in explaining Rhf1, but I selected the model 7 which is statistically significant and, F (5, 186) = 8.068, $p < .05$ (see Table 58).

Table 58.
ANOVA for Rhf4

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12.289	1	12.289	12.992	<.001[b]
	Residual	174.985	185	.946		
	Total	187.274	186			
2	Regression	22.053	2	11.026	12.279	<.001[c]
3	Regression	26.889	3	8.963	10.227	<.001[d]
	Residual	160.385	183	.876		
	Total	187.274	186			
4	Regression	30.761	4	7.690	8.943	<.001[e]
	Residual	156.513	182	.860		
	Total	187.274	186			
5	Regression	34.131	5	6.826	8.068	<.001[f]
	Residual	153.143	181	.846		
	Total	187.274	186			

To sum up, predictors Need2, TrainingPlace4, WorkYear, TrainingPlace5, and MLsResponsible7 explained the Rhf4. As it is mentioned before, approximately 18% of Rhf4 was explained by predictors listed above. The Variance Inflation Factor (VIF) measures the impact of collinearity among the variables in the regression model. VIF is 1/Tolerance, it is always greater than or equal to 1. Values of VIF that exceed 10 are often regarded as indicating multicollinearity. The value of tolerance should be > 0.1 (or VIF < 10) for all variables, which they are. The collinearity table 59 below showed that the VIFs range from 1 to 1.030. Especially I checked the model 5, the VIF and tolerance values are good (see Table 59).

Table 59.
Model summary

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	Need2	1.000	1.000
2	(Constant)		
	Need2	.999	1.001
	TrainingPlace4	.999	1.001
3	(Constant)		
	Need2	.985	1.015
	TrainingPlace4	.999	1.001
	WorkYear	.986	1.014
4	(Constant)		
	Need2	.984	1.016
	TrainingPlace4	.976	1.024
5	(Constant)		
	Need2	.982	1.019
	TrainingPlace4	.971	1.030
	WorkYear	.976	1.025
	TrainingPlace5	.976	1.025
	MLsResponsible7	.982	1.018

Summary of Regression Analysis

When KNf1: Teachers' MLs strategies for academic support) is dependent variable, the model including seven predictors: TrainingSupport, Need8, LangAssistance9, HighestDegree, TrainingPlace4, MLsResponsible, Need4 are independent variables. The predictors explained 43% of the KNf1. The model 7 which is statistically significant and, F (7, 186) = 19.298, $p <$ .05. When KNf2: Systematic school and district resources available for teachers of MLs to support for identification and placement is dependent variable, TrainingSupport, MLsResponsible1, Need2, LangAssistance9, LangAsistance2, Need13, LangAssistance5, Billingual, MLsResponsible5 are independent variables. These predictors explained approximately 47% of the KNf2. accounted for significant variation, R-square=.469, F (1,177) = 4.303, p< .05 (see Table 20). The model 9 which has F (1,177) =4.303, p<.05. When KNf3: District and school level supports available at administrator level) is dependent variable, MLsResponsible, MLsResponsible5, TrainingSupport, Need1, Training, Need8, HaveMLs, LangAssistance6 are independent variables. These predictors explained approximately 35% of the KNf3. The model is statistically significant and, F (8, 186) = 11.755, p < .05. When the KNf4: Data driven decision making about curriculum and instruction for MLs) is dependent variable, TrainingSupport, LangAsistance2, LangAssistance5, MLsResponsible2 are independent variables. The predictors explained approximately 26% of KNf4. The mode is statistically significant and F (8, 186) = 11.755, p < .05. When the KNf5: Teachers' willingness to work with MLs) is dependent variable, TrainingSupport, Need11, LangAssistance9, MLsResponsible1, Need12, and Need3 are independent variables. The predictors explained approximately 24% of KNf5. The model is statistically significant and, F (6, 186) = 9.246, p < .05. When the KNf6: Teachers' need for PD to support for culturally responsive teaching and support MLs' learning and engagement, Need11 is independent variable. The one variable accounted for significant variation and explained approximately 4% of dependent variable significantly. R-square=.037 F (1,185) = 7.206, p< .05. Need11 explains approximately 4% of KNf6. The model is statistically significant, and F (1, 186) = 7.206, p < .05. When KNf7: Teachers' Beliefs about language acquisition (bilingualism and translanguaging) dependent variable, Need11, MLsResponsible4, and TrainingSupport are dependent variables. The predictors explained approximately 10 % of the KNf7. The model is significant and, F (3, 186) = 6.665, p < .05.

When Rhf1: Establishing inclusion is dependent variable, Need8, LangAssistance5, LangAssistance9, Need14, TrainingPlace4, WorkYear, Need10. The predictors explained approximately 25% of Rhf1. The model is statistically significant, F (1,179) =4.330, p<.05. When Rhf2: Encouraging autonomy and cultural awareness of students and collaborative decision making with all is dependent variable, MLsClass, Need11, Need14, Hispanic, Need7, TrainingPlace4. The predictors explain the approximately 26% of the Rhf2. The model is statistically significant, F (1,180) = 4.391, p< .05. When Rhf3: Establishing trust and relationships is dependent variable, TrainingSupport and MLsResponsible3. The predictors explained 25% of Rhf3. The model 2s statistically significant, and F (1,184) =4.330, p<.05. When Rhf4: Providing transparent feedback and assessment is dependent variable, Need2, TrainingPlace4, WorkYear, TrainingPlace5, and MLsResponsible7 are independent variables. The predictors explained 18% of the Rhf4. The model is statistically significant, and F (1,181) = 3.983, p<.05.

Qualitative Data Analysis Findings

I created the Analytical framework using interview data. I explained the process of the designing the framework in the analysis section above. I used the Analytical framework (see Table 3). Specifically, when teachers were asked what their experience in teaching MLs, teachers stated that they were monolingual teacher with MLs experience (64%), monolingual teacher without MLs experience (7%), or bilingual teacher with MLs experience (29%). When teachers were asked the components of effective instruction for MLs, teachers included the instructional scaffolds [grouping (9%), pace (4.5%), culturally relevant teaching (4.5%), supporting academic literacy and reading skills (4.5%), comprehensible input (4.5%), other (4.5%), digital resources (18.5%)], pre-requisites for effective instruction [teachers' individual skills and experiences (9%), teachers' training (4.5%), teachers' knowledge (4.5%), contextual support and tools (14%)], pre-requisites for positive teacher dispositions and identity (4.5%), establishing relationship and building mutual trust and respect (4.5%), translanguaging (4.5%), and assessment scaffolds (4.5%).

When teachers were asked about what their approach for preparing the lesson considering MLs is (content and language objectives) (33%), they stated that instructional scaffolds prior the lesson [Pre-requisites for effective instruction] (48%), instructional scaffolds during the lesson [resources (scaffold), activity, strategies—what teacher is doing and student doing], and instructional scaffolds after the lesson [Assessment related scaffolds] (19%). When teachers were asked about how they engage, involve, and communicate with MLs in the mathematics classroom, teachers stated that providing enough time (32%), teacher Resources (21%), pre-requisites for positive teacher dispositions and identity (29%), establishing relationship and building mutual trust and respect (11%), translanguaging (4%), instructional scaffolds after the lesson [Assessment related scaffolds] (4%).-When teachers were asked about how they modify their mathematics curriculum, lessons, activities, and assessments to make these accessible for MLs and what strategies use, teachers stated that: instructional scaffolds (3%), teaching strategies (22%), teaching resources (8.5%), digital resources (11%), print resources (11%), pre-requisites for effective instruction (3%), pre-requisites for positive teacher dispositions and identity (8%), translanguaging (11%), assessment scaffolds (14%), and assessment related strategies (8.5%). When teachers were asked about how they build the background of the mathematical content for MLs, they stated that: instructional scaffolds (17%), teaching strategies (23%), providing enough time (3.2%), teaching resources (20%), digital resources (7%), print resources (7%), establishing relationships and building mutual trust and respect (13.2%), student motivation and engagement (3.2%), assessment scaffolds (3.2%), and assessment related strategies (3.2%).

By combining both survey and interview results Table 13 was prepared. In light of Table 13, results revealed that teacher used MLs strategies which teachers use to support MLs academic needs. They used appropriate materials, instructional resources, standards, objectives, scaffolding strategies (e.g., grouping, pacing, wait time, transparency in teaching, comprehensible input), assessment tools. These answers were included in both teachers' surveys and interviews. When teachers were asked in the survey if they can: conduct the classes in ways that help students understand the material regardless of language ability; know to develop content and language objectives; adapt the instruction for MLs; know to select appropriate assessment accommodations for MLs; help MLs students' understanding mathematics; feel confident coaching other teacher about supporting MLs; differ content and language objectives, be well prepared to work with MLs, adapt appropriate materials for all students; and feel confident to adapt classroom instruction to meet MLs' needs. Teachers' both self-reports and their interviews resulted that they feel confident to use multiple strategies, scaffolding techniques, and translanguaing strategies in their instruction with use of variety of both digital and resources and do appropriate adjustments for their MLs and also all students through the use of the material in instruction, problem solving, and during the assessment.

Similarly, results also showed that teachers can communicate about systematic school and district procedures for dentification and placement of MLs with teachers. This is a f foundational procedural information that are provided for teachers to establish initial rapport with MLs as pre-requisites for effective instruction. Also, these answers were included in both teachers' surveys and interviews. When teachers were asked in the survey if they: need information (e.g., documents, report card, phone call) translated; know where to go for support; know their schools have any system in place for monitoring the English proficiency levels of MLs; know how MLs are identified, and if they receive information about newly identified MLs; understand how MLs exit the language assistance program; and know who reach out to if I need support working with an ML. Teachers' both self-reports and their interviews resulted that they feel sometimes confident to know these available resources, so as they stated in the interviews that there is a huge need for the support of the schools and districts to educate teachers about foundational resources they are available for them to support MLs and to meet with the needs of MLs in their mathematics classroom. These are also helpful resources for teachers to get to know their students so that they can use decide their strategies and available resources to use for teaching and assessing MLs in their classrooms.

Additionally, results also demonstrated that teachers need to know district and school level supports available at administrator level. Different than the foundational resources, this is mostly about the contextual support and resources that provided for teachers to improve to the instructional design for MLs by the district and school. Teachers were asked if they agree that they are getting enough contextual support from their school and districts about Bilingual/ESL services support the instructional needs of MLs. Also, they were asked if they are believing that their district's administration understands the needs of MLs; provides appropriate resources to support the instruction of MLs; allocates appropriate staffing to support the instruction of MLs; and regularly make resources and materials available for use in classrooms. They were not feeling strongly agreed that their districts were supporting them contextually. They were feeling they were needed more support to learn about the available contextual supports that will support their instruction design to teach mathematics MLs and support their engagement with the appropriate strategies and resources that are provided by the administrational level to meet with the needs of MLs.

Also, results also indicated that teachers should be able to do data driven decision making about curriculum and instruction for MLs. This requires them to be more knowledgeable and competent about using student data to make curricular and instructional decisions for MLs. When teachers were asked if they believe that in their schools, they review data regularly to inform instruction for MLs; analyze the results of MLs compared to their non-ML peers; checking if there is any achievement gap between MLs and their peers. So, they were also questioned that if there is a gap, if they work to develop a plan of action to support MLs to try to close the achievement gap. They were also asked if teachers in their schools regularly meet to discuss strategies to help MLs access grade level content when making decisions about curriculum. Teachers were mostly reporting in their surveys and sharing their thoughts about these in their interviews that these are all tried to be done based on their individual effort more than collectively working on it with the school and other teachers. Teachers were really in need of the support that can come from schools and other teachers so that they can use the available data they have in way that will inform their future instruction designs, selection of strategies and resources for their teaching and assessment of MLs.

So, beyond the foundational and contextual supports that came from both schools and districts, the other important point is if the teachers are eager to support their MLs. In order to investigate this, teachers were asked about their willingness to work with MLs. Teachers were asked if they think that MLs are a welcome addition to their classrooms and if they would prefer to have MLs in their mathematics classes. In both surveys and interviews (except for one teacher), they strongly agreed that they were feeling comfortable to have MLs and willing to support them in their classroom to teach mathematics and boost their engagement to contribute to the class more.

Moreover, it was important to know what teachers are thinking what they need to support their MLs. So, the results revealed that teachers' need for professional development (PD) to support for their culturally responsive teaching and support MLs' learning and engagement. In both their surveys and interviews, teachers stated that PD can provide them a a consistent and sustainable support to improve their culturally responsive instructional practices because they strongly agreed that there is a need to have a PD on (1) understanding difference between language acquisition and learning disabilities, (2) special education evaluation for MLs, and (3) developing culturally and linguistically responsive individualized education programs (IEPs.)

So, when the details of teachers' beliefs about teaching and engaging MLs were zoomed in, there is need to understand: what are the teachers' beliefs about language acquisition which is about how languages are learned and sustained. In both surveys and interviews they were questioned about their beliefs about language acquisition. However, teachers were believing that MLs are retained too long in bilingual classrooms at the expense of English acquisition; learning in one's first language interferes with learning in a second language; and research remains inconclusive about the benefits of bilingual education; and most importantly, the use of the first or native language at home interferes with the speed and efficiency of second language. Teachers brought their concerns about the language acquisition of their MLs and how these impact their teaching and MLs' engagement in the mathematics classroom. The results and teachers beliefs and concerns showed that there is need a further study to zoom in more teachers' beliefs and what can be done to figure out how languages are learned and sustained and how these can be done in the mathematics classroom by suing appropriate scaffolding and translanguaging strategies using multiple resources in both instruction and assessment.

So, what is the overarching result of all of the above findings? The answer is simply: Establishing inclusion. There is a need to know if teachers are establishing inclusion through CRT in mathematics classrooms. If yes, how frequently do they (1) include lessons about the acculturation process, (2) examine mathematics class materials for culturally appropriate images and themes, (3) ask students to compare their culture with American culture in some mathematics classes, (4) learn words in students' native languages, (5) encourage students to speak their native languages, (6) spend time outside of class learning about the cultures and languages of MLs, (7) supplement the curriculum with lessons about international events, and (8) encourage students to use cross-cultural comparisons when analyzing material? Teachers' responses in surveys showed that teachers are self-reporting they either always or frequently are careful about these eight items in their classes. However, their interviews clearly showed that really need the support of PD to learn about how to establish inclusion in their mathematics classroom.

The next results focus on if teachers are encouraging autonomy and cultural awareness of students and collaborative decision making with all. This is about co-constructing culturally responsive classroom practices with students. Teachers were asked how frequently they 1) allow their students to work independently, selecting their own learning activities, 2) include lessons and problems about anti-immigrant discrimination or bias, and 3) ask for student input when planning lessons and activities. Teachers were confident that they were either sometimes or rarely encouraging their students' autonomy and cultural awareness since they shared that it is really challenging to do this when they have to teach all students mathematics and engage MLs in the classroom by finding the best strategies and finding the appropriate resources to cover the curriculum in a timely manner.

Furthermore, when teachers were asked about their beliefs, perceptions, experiences, and strategies related to establishing trust and relationships to create a welcoming classroom climate where MLs can confidently interact with their peers and teachers without hesitation. They were asked, in order to do so, how frequently they make an effort to get to know the students' families and backgrounds and find out about the students' classroom preferences. These were rarely done by teachers. Also, this was also discussed with them in their interviews and was concluded that establishing the trust, particularly, mutual trust is very critical as one of the CRT practices (see the Discussion section). This is very essential for CRT and helpss teachers to get to know their students, know their prior knowledge, gain their trust, and provide a safe space in which their students can be more responsive. However, as teachers shared that getting to know students and their prior knowledges, their cultural values and so on takes a long time and can be impossible to learn when teachers are trying to teach all students and cover their instructional plans and curriculum materials by using multiple strategies and resources. However, this is the core of CRT (Ladson-Billings, 1994). More discussion about this is provided in discussion section.

Finally, with teachers, providing transparent feedback and assessment was discussed. Teachers were asked about the strategies that they use to plan, implement, and evaluate reviews of students transparently. They were asked how frequently they use peer tutors or student-led discussions; elicit students' experiences in pre-reading and pre-listening activities; and provide rubrics and progress reports to students. They either said usually or sometimes. Also, teachers' interviews showed that teachers need support to provide transparent feedback and assessment.

They were either thinking about completing their teaching task in time without focusing on any other things or about the central tests that were important for their school districts. In order to make students ready for tests, they could not spend time with transparent feedback or adjustments of assessment, undervaluing the importance of inclusion. These sentiments were also reflected in their cultural awareness levels in the next section.

Qualitative Data Analysis Findings: Cultural Awareness Levels

This section includes qualitative findings based on my analysis of teachers' interview data. I organized this section considering the four levels of cultural awareness: Parochial, Ethnocentric, Synergistic, and Participatory third culture. For each level, I provided one example that came from teacher interviews. Only one teacher's interview was selected for each level as an example because it is the best representative of this level. It is challenging to find examples of representations of extreme end points because oftentimes teachers don't transparently admit their unconscious incompetency's. Therefore, since I had good representations of the extreme end points of the levels of cultural awareness and there was only one teacher representation of these two levels, I made the executive decision of providing one example representation of the four levels of cultural awareness for consistent reporting of findings.   The examples were chosen considering the definition of the four-level awareness stages in Chapter 3 and were chosen based on the strongest evidence from teachers' interviews.

Parochial Level

At this level, people are members of the dominant culture; however, they may lack knowledge about other cultures and competence (Quappe & Cantatore, 2005). As the teacher reports, Carl was from a white dominant school district in which students generally come from a moderate or high level of social-economic status.

Multiple indicators from the interviews are shown (with the asterisk symbol: **). The asterisk symbol identifies interview excerpts that are directly aligned with one of the indicators of the level, whereas excerpts that provide supporting evidence but do not directly align with an indicator do not have an asterisk. A relevant discussion is provided in the summary section that justifies why Carl was categorized in the Parochial Level. At this level, the teacher shared that he has "less empathy for students with diverse backgrounds because I am not from a diverse background". This aligns with the claims of Quappe and Cantatore (2005) who stated that at this level, teachers have either no empathy or less empathy for their students with diverse backgrounds and lack of understanding of students' needs. Additionally, also aligned with the claims of Quappe and Cantatore (2005), the focal teacher has difficulties recognizing MLs' challenges in his classroom, so he did not think of potential ways of assisting diverse students.

Teacher as an Example for Parochial Level. Teacher 1 (Carl) stated that he had been a mathematics teacher for 25 years in high school and middle grades.

Carl's Prior Experiences with MLs (from His Perspective). At the time of the interview, Carl was teaching in a high-achieving school where the district's diversity is low. Carl shared that "having MLs in our school is new, and **MLs must adapt by themselves." Carl also said that "**I have never had any experience, training, or interest in how to teach and engage MLs." Carl has had few MLs and thought he had done his best under the circumstances. Carl stated that he had a couple of students who could speak three or four languages. English is one of them, but it is not their preferred. He also said, "So that's where it's easier to fight that battle, as opposed to the kid who has come to America from a Southeast Asian nation. Because written communication is drastically different”. He stated that he did not have any professional development in teaching and engaging MLs.

Carl’s Needs for Teaching Mathematics to MLs (from His Perspective). Carl repeated throughout the whole interview that “**My only role is teaching the curriculum, and that is all I can do.” Carl frequently shared that “**I am not the person who will provide or search for the available resources for MLs because this is the district’s role or the staff’s” (who is specialized in MLs) role. He said that since he is under-resourced, **he cannot do anything for students who do not have verbalization skills”. As Carl stated, “there is not enough staff at the school, and my district has never provided resources that are available and accessible for MLs except for Chromebook.” So, as he mentioned earlier that **dealing with MLs is not his responsibility because he believes that his only responsibility is to teach the mathematics curriculum promptly. Carl mentioned that the curriculum is undoubtedly paramount and getting through the curriculum is always the goal. Furthermore, he said that:

> *my role is not to modify the lessons for the occasional MLs in my mathematics classroom, and I cannot sit with MLs to deal with their language issues when I must spend time with mathematics content with all students.

Carl would like to have a universal translator with a word device that could give the student a written communication of what he is saying in real-time. Because of being under-resourced, he thinks that **it is challenging to adjust MLs' content, teaching practices, and assessments. So, his paramount need is to translate his verbal communication into a written text to teach MLs. He perceives that would be the easiest and most cost-efficient way to teach MLs unless the district provides him with a staff who can help him to support MLs' learning.

Carl’s Beliefs for Teaching Mathematics to MLs (from His Perspective). Carl believes MLs are just learning the English language for the first time, which is frustrating for the teacher from a curriculum perspective. According to Carl, **MLs sometimes were not great, so he was just trying to get the immersion treatment. He also considered that “**not having English as a native language can be accepted as a disability, especially if they've been in the States for less than a year.” Carl has many students who are just English speaking, and he said that “so that ends up being my only focus.” But still, he clearly stated that he considers himself “an inclusive teacher” even though he didn’t make any accommodations for MLLs. Carl said, "**I would not go into the doctor’s office and tell a doctor how to treat,” so he does not want to pretend he knows the solutions to what a bilingual learner or a non-native English-speaking learner would learn best from mathematics curriculum.

Carl believes that he “**must treat every student equally” and “**cannot do anything specific for anyone in this classroom.” According to Carl’s belief system, the most promising approach to teaching MLs is a bilingual approach which can only be done by a bilingual mathematics teacher so that assessment can be done bilingually and MLs can learn the content more efficiently. However, Carl said, "**this is not a thing I am interested in applying.” Especially during the pandemic, he highlighted that “**MLs have been on their own.” Carl said, “I tried my best to provide them with a positive experience” by trying to teach the curriculum. He shared that “**having difficulties communicating with MLs who even do not grasp almost half of the English language and are incapable of listening to English in the mathematics classroom” makes everything harder for him.

Carl’s Practices for Teaching Mathematics to MLs (from His Perspective). Teacher 1 shared that “**not frequently, but sometimes I can consider grading them differently because of their deficits." However, he shared that **he does not use scaffolding techniques, and he is used to starting with a warmup activity and going over any homework. He said that he could only consider changing his pace in class for some circumstances, but he prefers "**the majority dictate the pace." He also stated that **he has never thought about if he has any specific discourse moves to support MLs' engagement.

Summary. When Carl's example was reviewed, especially considering the four-level cultural awareness definitions (see Chapter 3) and the statements shown with ** asterisk, he falls under the parochial level of awareness.

Because Carl emphasized that "I am aware of the only dominant culture that I came from." Carl clearly said that he does not intend to learn about other cultures because he believes that the only obligation of a mathematics teacher is to teach the curriculum in time. These are aligned with the description of the parochial level, which is the level where people are aware of their way of doing things by ignoring other cultures unconsciously. According to Quappe and Cantatore (2005), at this level, people do not even know what they do not know. Quappe and Cantatore (2005) stated that being aware of other cultures is not an easy task "since we are born, we have learned to see and do things at an unconscious level "(p.1). Recognizing the differences between other cultures and, valuing their norms, accepting that certain activities in different cultures could be different is an ability that develops over time (Constantin et al., 2015; Quappe & Cantatore, 2005), especially it is very critical for teachers to develop (Wilson-Brooks, 2010). "Culture defines how a given group of people interact" (Merriam-Webster, Inc., 2003, p. 348). So, it is required for interaction in teaching and learning mathematics.

Indicators through the example showed that Carl was not aware of other cultures and their norms, so he was unconsciously incompetent about different cultures. This, in turn, impacts the support MLs can receive for constructing knowledge and building on their personal and cultural strengths. Additionally, teachers might not examine the curriculum from multiple perspectives; thus, creating inclusive teaching can fail (Wilson-Brooks, 2010). He does not acknowledge his cultural incompetency and needs for professional development to meet the needs of MLs, as Carl stated that his lack of empathy, experience, and knowledge for teaching and engaging MLs is not his responsibility. Carl even overlooked his need to build a solid foundation and develop strategies for teaching and engaging MLs. Carl was unable to recognize what he needed and was not open to discussing potential supports that he may need as demonstrated by his comments above. To sum up, Carl's experiences and beliefs indicated that Carl did not recognize the needs of MLs in the mathematics classroom. His statements about his experiences, conditions, and beliefs showed that this example is representative of the Parochial Level.

Ethnocentric Level

At the ethnocentric level, people tend to deny the existence of cultural differences while they recognize that there are differences (e.g., 'I don't see color!'). They also have a defense to demonize their cultural differences. At this level, people also might minimize cultural differences by thinking that people are more similar than dissimilar. At this level, people are prone to imposing their value system upon others. They believe that while they are correct, others are confused. They might perceive the cultural differences as problems. They might not develop cultural self-awareness since they assume that all cultures are fundamentally similar.

Teacher as an Example for Ethnocentric Level. Teacher 4 (Ada) has been teaching middle grades mathematics for almost 20 years.

Ada's Prior Experiences with MLs (from Her Perspective). Ada has been teaching MLs for many years. She had students from Egypt, Pakistan, and Afghanistan across her teaching career. During her interview, Ada repeated that she thinks that there are cultural differences that make teaching and learning mathematics challenging. She feels that as a teacher, her goal is to teach her students mathematics in English by "representing the dominant culture" as a teacher.

Ada's Needs for Teaching Mathematics to MLs (from Her Perspective). Ada stated that she needed access to the internet to be able to use Google Translate for MLs when required. She wants all of her students "to use manipulatives and hands-on play when learning the content". She said that "MLs enjoy using these supplemental materials" when she is teaching the content. She also stated that, "[**]I use dictionaries when I'm communicating with parents, and everything that goes through Google Translate, but in the classroom, only English, since we're not an immersion school."

Ada's Beliefs for Teaching Mathematics to MLs (from Her Perspective). She was aware of the cultural differences; however, she mentioned that her students must be forced to adapt to the U.S. system. She cannot modify her instruction for specific students because she has to treat all students equally. She highlighted throughout the interview,

> [**]they must adjust to the US system because it is the best way to succeed and learn the content". Ada mentioned that "…and most MLs have not experienced life…They have had interrupted schooling…So I force them to communicate in English as much as possible, again, because that's, you know, this is the language they need.

As clearly demonstrated by teachers' comments from the interview, Ada's beliefs were ethnocentric because she placed her culture at the center (Booth, 2017) and believed that her students must conform to the U.S. dominant culture.

Ada's Practices for Teaching Mathematics to MLs (from Her Perspective). Ada said

> **I am very explicit, and I do not change or lower the language expectations. Because my expectation is the student needs to be able to succeed. I teach everybody with high expectations, and they have to adapt to that. I do not lower the standards.

Ada shared that she tries her best to teach mathematics for MLs and does not modify any of the materials and tests. She says that:

> **I do not want to change the language because they will get a test with others, which will impact the school's success. I am showing kids what they need to learn because they decided to live in the US, so they must understand the dominant language and culture.

She also says, "*in the lesson plans, everything's written out. So, I must complete everything in time". She added that she uses technology (e.g., Desmos) to support students' learning and engagement. Because she believes "it is less wordy so that they can feel more comfortable… using their knowledge that they learn from their own cultures, countries quickly". She highlighted that:

> **I don't spend time going backward. I give them exactly what they need to access the material going forward. So, the biggest thing for us, the thing we spend the most amount of time on is numeracy. Skills, basic numeracy, if they can add and subtract two-digit numbers, they know how to carry, they know how to borrow, and then if they can multiply, if they can't multiply…they need to understand those numeracy skills in

seventh-grade, sixth grade, certainly for eighth grade. So that's what I spend our time on. But I don't spend much time going back on to any other skills. I teach it as we see it.

As stated by the teacher, she doesn't put forth an effort to build background knowledge for MLs who may need the support or to activate their prior knowledge. Additionally, she believes that students must adhere to the ongoing curriculum and be responsible for building the necessary knowledge to succeed at the next level.

She also said that:

> **I asked them to talk a lot. So, they are talking to each other. And they're talking to me. I want them to talk a lot, and I want them to know that they must be able to say the word correctly. They can't say liner. They've got to say linear, right? And you know that that's like a big one, because of how the world looks. Um, but you know, the more confident they become, the better off they are.

She also stated that "**they need to understand what I when I say when I talk about coefficient or variable, they need to be able to recognize all those words."

While the teacher thinks it's necessary for students to be able to use language and content terminology productively, she doesn't explicitly make an effort to scaffold or teach the content specific vocabulary in her lessons.

Summary. As reported by Ada, she recognized cultural differences. However, she forced her students to adjust to the dominant culture by not communicating in their own language. She was unwilling to learn how her students thought or how they understood the content in their cultures and countries. Instead, she felt that she represented the dominant culture to make them absorb to make their transition easier. She pushed her students with linguistic challenges to learn mathematics without enough appropriate support (considering their academic capital) as evidenced by her comments during the interview presented above. Thus, these are valid for the classroom setting too. Based on Ada's interview, it was clear that she was conscious of cultural differences, but she was culturally incompetent.

Synergistic Level

At the third level, people know cultural differences and practices, and they believe these differences can be valuable. They must figure out the best way to do things (it does not matter the use of their way or others' ways). However, culturally acceptable behavior does not come naturally yet. This requires a conscious effort. At this level, people are aware of how others perceive their behavior.

Teacher as an Example for Synergistic Level. Teacher 11 (Felix) has been teaching middle grades mathematics for more than 20 years.

Felix's Prior Experiences with MLs (from His Perspective). Felix teaches middle and high school grades mathematics. He knows a little bit of Spanish but has never taught mathematics in Spanish yet. Felix shared that he was aware of the cultural differences and these differences are essential to have in the classroom. He said that "I value diversity and deliberately do my best to provide an inclusive learning experience for all students." This teacher is consciously competent in recognizing the various strategies that he needs to implement to support his students.

Felix's Needs for Teaching Mathematics to MLs (from His Perspective). Felix shared that he [**] needs to arrange meetings with the ESL teacher frequently to check his strategies are efficient for MLs in general and learn other methods he can use with his MLs. He likes to use supplemental materials such as Khan Academy, base ten blocks, or algebra tiles when teaching as manipulatives to support instruction of MLLs. He always makes them ready to use when needed in his classroom. He believes that to provide MLs with the best learning experience; there is a need to know about students' backgrounds. However, "learning about their backgrounds is not an easy task" for him, so he ** needs to improve his strategies to understand their background. He mentioned that "knowing MLs' backgrounds also can help create more relevant real-life problems for MLs." As a teacher, he needs to "**investigate the strategies to learn about MLs more" so that he can provide a more culturally relevant learning experience.

Felix's Beliefs for Teaching Mathematics to MLs (from His Perspective). Felix believes in the "**power of deliberately encouraging discourse among all the students to get them talking." He believes that "making MLs talk with each other is a fundamental task for a teacher." He stated that "every person brings something to the table, and it's so important to be curious about each other." He **" intentionally creates a classroom environment where everyone can feel comfortable using multiple strategies." He also said that if he can "connect with them enough, things can stick better." As a teacher, he believes **he investigated multiple ways to support students' interaction and make them feel comfortable connecting with others. He is also modifying his strategies until he finds the most efficient one for his students intentionally. He stated that **he loves to use his technique to have a good instruction with all students because he stated that "**if an instruction is a good instruction, good for MLs, then it would be good for everybody." He also added that students from different cultures brought their way of problem-solving approaches to good instruction. Their diversity would be reflected in the variety of solutions created through the multiple views by students. So, he stated that he values cultural differences because "**they are useful for all students and contribute equally to problem-solving." As Felix repeated during his interview, having genuine good instruction by inviting all students to contribute to the process is not easy. From the teacher's perspective, ** teaching and engaging students is a highly complex task for a teacher, mainly when the teacher has already been occupied with all other things in the mathematics classroom. Moreover, he shared that

> **the challenge is that it becomes not necessarily just about mathematics but also about language. And math is a language in some ways, but that's always the challenge. I got to get through more material because I got to get him ready for algebra two or something.

Although teaching mathematics to all students is a challenging task, he also believes that he **succeeded just to clarify that he is "ready to help them whenever they need it."

Felix's Practices for Teaching Mathematics to MLs (from His Perspective). Felix stated that he "**supports MLs with organizational skills test-taking strategies to finish their assignments in time." In the class, if there is a new vocabulary word, Felix **uses his strategy and asks his MLs: "Do you know what that means? Let's write it down. Let's go over the definition a little bit. Let's make a diagram that helps you remember the definition". He stated

> **connecting the language to the math is an important part, whether it's vocabulary or just taking the time to do fewer problems better. I think that's good for all students as well as MLs. Because if you try to do too much, you get bogged down and a little nervous about how to move forward.

Additionally, he shared that he

> ** touch bases with MLs every day to just say, hey! How's it going? Take a look at their work especially. When I assign something, I'm circulating and looking at their specific work to see if they're up to speed".

He said that he

> [**]was clear about what the mathematical goal is to the teacher. And to not try to do too much, do fewer things a little better. I think that benefits because then it's manageable amounts, whether there's one, one, or two or three, maybe five instead of doing 25 math problems.

He also likes to use formative assessment to get a sense of MLs' progress which helps him in [**]the lesson planning and figuring out the next steps. He said that

> when I'm speaking, and I've tried to enunciate, you know, and just slow down, and that's good for all students just to make the directions clear and make the launch clear. And then they'll do better work when they're working on it on their own. But I try just to touch base, have the kids speak to each other, and speak back to me about the task just for clarity. I also tried to say things a couple of times and enunciate when I tell them and just be more straightforward and more precise in my directions because it's not so much what I'm saying, it's what they're saying they're working on. They're the learners.

Summary. Felix is an example of a Synergistic Level. Teacher quotes indicated that Felix has improved his strategies and made them work in the classroom when teaching mathematics. He has been conscious of cultural differences and valued the cultural differences. As seen in his quotes, he was deliberately investigating the multiple best ways to be culturally relevant to his students. However, his actions were not still at the participatory level where teachers should unconsciously have cultural awareness, and they naturally happen. He improved his skillset with a willingness to objectively examine the values, beliefs, traditions, and perceptions of cultures and walk in his students' shoes regarding their cultural norms (Constantin et al., 2015; Quappe & Cantatore, 2005). At this level, the teacher tries his best to promote cultural diversity without judging anyone and being empathetic toward all students from different cultures. He has the skillset to tangibly evaluate situations without stereotyping and assumptions. That helped him to improve his cultural awareness. The only difference from the participatory third culture level is Felix is not still at the participatory level yet, since at the last level, where sharing and leading others to make a better sense of cultural differences and helping them to gain and improve strategies to teach and engage MLs in the mathematics classroom is accepted as the primary role and teachers do their actions naturally.

Participatory Level

At the participatory level, the people are aware that "learning to recognize and appreciate cultural identities of others is a necessary and needed skill as the growing diversity in the US means more voices are added to our global society" (Schall, 2010, p.167). At this level, teachers should be aware of the cultural norms of diverse groups (Quappe & Cantatore, 2005) because they are aware of the other cultures that help them design instruction and teaching practices accordingly. Multiple indicators from the interviews in the example are shown (with the asterisk symbol: **). The summary section provides relevant discussion showing why the example was categorized in the Parochial Level.

Teacher 9 as an Example for Participatory Level. Teacher 9 (Merida) stated that she had been a mathematics teacher for more than 10 years in high school.

Merida's Prior Experiences with MLs (from Her Perspective). Merida has worked with multiple exchange MLs in her classes (e.g., Asian, Guatemalan, and Spanish students). Although Merida is not working in a diverse state, except for exchange students in general, Merida is motivated to be aware of culturally responsive teaching strategies.

Merida's Needs for Teaching Mathematics to MLs (from Her Perspective). Merida stated that "**there is a need for the multiple resources to support learning and engagement of

MLs." Merida said that she remembers one of her students from last year whom [**]she worked with him one-to-one and taught mathematics in Spanish by relying quite a bit on translators and bilingual materials. So, [**]Merida used bilingual materials during her teaching. She shared that "[**]the use of bilingual materials helped me reinforce the language acquisition." Merida experienced that "[**]if students have provided access to the materials in their native language, not being fluent in English is not a barrier to accessing curriculum and learning mathematics." As Merida shared, "[**]this not only provided MLs access to materials to learn mathematics but also encouraged them to integrate into the education setting in the US."

Merida also mentioned that "[**]collaborating with other teachers and staff about teaching mathematics to MLs is critical." For example, as well as supporting students learning mathematics with multiple bilingual materials, she also believed in supporting the extra help of the ML teacher at the school. Merida shared that "[**]this support also helped teachers plan their lessons to support MLs' language development and mathematics learning, adjusting their background knowledge to a new education setting in the US and giving students opportunities to access the grade-level content in bilingual languages." She also added that "[**]Not only academically, but also socially providing MLs access to materials in multiple languages is essential; for example, adjusting the setting of a copy machine in different languages" (to ease MLs' transition to the new system and to support MLs outside of the classroom).

Merida's Beliefs for Teaching Mathematics to MLs (from Her Perspective). Merida said that she always positioned herself as a teacher and lifelong learner of mathematics language. Merida stated that "[**]I enjoy languages, welcome all students, establish strong connections with them, and care about their personal experiences." [**]Merida also loves to empathize with her students. Thus, Merida thinks about how she wants to be treated by a teacher and what would be most helpful to her if she were in a setting where the language spoken was not her native language. Merida said that she imagines herself in that circumstance.

Merida argued that "**teaching in multiple languages is not an easy task; however, making materials accessible in multiple languages is very doable and supportive for MLs and all students in the classroom." Because **Merida always believed that mathematics is a universal language and requires comprehending its unique literacy and acquisition for both teachers and learners. So, teachers can utilize their experiences with their MLs to teach mathematics as a new language to all students (who are all learning a new language: "mathematics").

Merida stated that "**I consciously reinforced English learning simultaneously as teaching and filled in those mathematics gaps because some students were coming with interrupted formal education." So, Merida's students can need more supplemental support and activities, such as an instructional video. Depending on the situation, **Merida stated that she tended to be an adaptive teacher, so **Merida adapts her instruction and assessment according to MLs' needs. Merida groups students together based on their common needs. **If there is an individualized need, Merida will adapt her instruction.

Merida also asks students to write an **autobiography at the beginning of the year, and she makes students self-report what their experience has been in the mathematics classroom (e.g., Merida asks what they do outside of school, if they have jobs if they have interests if they play sports, and so on). Merida said that "**I always look for ways to make it personal for the students (that is not provided in textbooks) so that they can see its relevance in their own lives."

Merida also investigated **websites that she can use in her teaching; for instance, EdPuzzle is one. She has used this website to find mathematics videos in Spanish, and Merida watched them able to teach content in multiple languages. Merida was preparing first for her

MLs and then using those videos to reinforce it in English with MLs. Merida believes that we live in a century where we have access to technology, translators, and translated curriculum materials. She said that “**so, the only thing teachers needed is having the courage to use bilingual materials in the mathematics classroom and empathy for their students.” Merida said that she loves professional development as Merida investigates bilingual resources and practices different languages to teach mathematics to her students. Merida stated that

> **sometimes, teachers think that they use real-life examples without knowing students' culture, knowledge, beliefs, traditions, etc. For example, some students do not understand what popcorn kernel means or being microwaved. However, this is not a relevant example for all students.

Merida also observed that MLs are picking up technologies quickly and using them effectively. She said that “**It's something they are born with even if they have never experienced it.” Also, **Merida stated that some textbooks are also very outdated, and they are not also relevant to them anymore. She believes that “**students need to have something that's going to be it's going to resonate with them that's going to feel relevant to them that they could see it being applied in a real-life context.”

Merida's Practices for Teaching Mathematics to MLs (from Her Perspective). Merida stated that she **provides assessments to MLs in their native language, and she checks in with them again to make sure they understand the instructions and problems. Merida also shared that she “**looks at their responses to determine if they have additional needs beyond.” Merida shared that **she always provides them other opportunities to assess that material after they have gone over it and practiced so that reassessments can be necessary.

Merida shared that she "tries to naturally slow down her speaking and enunciate" because she wants "the learner to be able to distinguish the different words" that she says. Merida **provides more than one way to reinforce the material and gives them different options. Merida believes that "**if students have a choice, they feel that they have some control of what they are doing." She also **recognized students' engagement increases as she provides them with choices. She calls this "**cooperative learning." Merida likes to "**push them out of their comfort zone when Merida encourages them to work with their groups". Merida says that "**being aware of students coming with their unique backgrounds is critical." Merida also mentioned that she really "**can empathize with them and so all the culturally responsive teaching practices are happening by default." Merida stated that "**even many American teenagers are not fluent in math and do not have the required numeracy skills." Merida says that she calls herself "**a math translator for all students including native speakers" (e.g., translating something in a math textbook to a "mathy" language to help them make more sense of terminology in real-life contexts or even for native speakers).

Also, Merida stated that she uses "**non-verbal ways to explain the content to all students" (e.g., gestures, drawings). The use of non-verbal techniques because "**they are helpful specifically to teach word problems since most students do not like word problems so that verbal mathematics can be difficult for even native speakers." Moreover, she shared that "**using word problems without non-verbal techniques can add a new layer to the complexity of learning the content, and this only compounds the issue for MLs." Merida firmly stated that "**good mathematics instruction presents the material by using scaffolding techniques every day" (Merida has students break down a problem, highlight important details, and highlight the words around the numbers). She likes to draw pictures to visualize the situation and make students connect with different visualizations. Merida mentioned that if she **notices the student is not comprehending the way it is presented, then she tries a different approach and makes up several scenarios that all are similar until they start to see the connection. Merida does a lot of individual **check-ins with the student and monitors their learning just as she delivers the instruction.

Furthermore, she highlighted that "**if Merida gets any blank stares or no pencils moving, she immediately checks in with the students to see where they are stuck". Merida shared that she **strategically partnered MLs with students who would be patient with them and ideally with students who have languages as a strength (e.g., partnering a Guatemalan student with another student who was strong at Spanish). Also, Merida sometimes prefers to **partner her MLs with other students who have similar interests to help them develop relationships with their peers by eliminating language barriers and making them a powerful access point to the language. Merida believes that this helps them have better social interactions in the classroom. She pointed out that "**building the relationship between peers is mutually important for all students." Merida says that "**it is important to peer MLs up with English-speaking peers to provide MLs a platform where they can develop their language acquisition skills in a social context." Merida also loves making manipulatives and hands-on available for students (e.g., the use of algebra tiles). That helps all students to make more sense of the content.

Summary. Indicators that were shared in the subsections above showed that Merida is the participatory level. When Merida's example was reviewed, especially considering the four-level cultural awareness definitions (see Chapter 3) and the statements shown with **, she falls at the participatory level. The interviews with Merida consisted of the indicators she had a solid understanding of the dominant culture and other cultures and how the cultures can shape students in the classroom. She unintentionally utilized her knowledge and experiences with other cultures when teaching mathematics in new situations. She has developed a belief system that values diversity and serves all students in the diverse classroom when teaching mathematics. She shared that she could succeed in making connections between cultures and teaching mathematics. She has clearly shown (1) interest and openness to other cultures, (2) an understanding of practices in different cultures, (3) the capacity to communicate about cultural differences in social context and mathematics, (4) the capacity to use different cultural knowledge in authentic situations, and (5) the capacity to evaluate the practices of people from different cultures" (Frank, 2013). Because in the example of Merida, the participatory level is achieved, Merida had a better understanding of the shared values of dignity and solidarity (Quappe & Cantatore, 2005; Theriault, 2005).

Summary of Findings

This study revealed that some teachers do not feel prepared to implement strategies to provide academic support for MLs, feel comfortable or prepared to guide other teachers. They also did not think they were reasonably well equipped with strategies and resources provided by schools or districts. Teachers felt comfortable selecting and adapting materials and strategies but less comfortable using assessments for MLs. Teachers knew about the procedures for MLs' identification. They also knew who to reach out to when they needed help for MLs. As opposed to teachers' knowledge of identification procedures in their schools, they reported that they were less knowledgeable about the district and school supports at the administration level. Teachers believed that they needed support from the district for available resources, information, and staff assistance for MLs. Teachers did not feel supported regarding MLs. Teachers mainly stated that they were not discussing things (the achievements, strategies, tools) in the school. So, these results are a good indicator of the teachers' needs when trying to support MLs.

Additionally, teachers felt that MLs were a welcome addition to their classes. Teachers also agreed that they needed PD to support ML's teaching and learning. Also, teachers shared that the use of the first language impeded English language learning. The results showed that many teachers did not use inclusive practices when integrating students' cultures and home languages in the classroom. I believe that when students do not feel valued in terms of their cultures and home languages, they will not trust the teacher, therefore, will not be engaged in the classroom. Most teachers did not include culturally responsive practices in their pedagogy. The teachers only got to know their students at a surface level without much detail about their backgrounds. Teachers also stated that they did not get to know their students at a deeper level. Also, half of the teachers did not provide scaffolds or alternative assessments for MLs. This was also aligned with the interview findings where teachers stated they did not make an extra effort to accommodate for MLs. However, I believe that providing scaffolds or alternative assessments for MLs is very critical. Especially considering their abilities by checking their prior mathematical knowledge, when teachers provide them scaffolding and adjustments, they not only learn the content better but also learn use and improve their critical thinking skills (knowledge, comprehension, application, analysis, synthesis, and evaluation) by rejecting seeing the language as a barrier. Therefore, I can say that teachers' beliefs, perceptions, experiences, and strategies can impact their abilities to teach diverse learners in numerous ways that can be detrimental to students' learning and engagement.

CHAPTER 6: DISCUSSION

My findings indicated clearly that teachers need further development in supporting MLs. In this section, I will highlight areas that are critical to support MLs. These areas were decided based on the results of my dissertation study, literature, and my own experiences. Informed by my own experiences as a transnational multilingual learner in higher education from a multifaceted background different from the dominant society, I have experienced multiple challenges due to my intersected identities. I always believe that as a mathematics educator, I cannot overlook that race, culture, class, gender, ability, language, sexual orientation, religion, and socioeconomic status are important factors contributing to people's success in the American education system. Increasing diversity in the U.S. student population has been reflected in K-12 education; however, serious underachievement of historically excluded groups persists at all levels due to structural inequalities. In addition to my challenges, my unique position has also afforded me opportunities to advance diversity, equity, and justice by working with mathematics teachers of MLs in this research that aimed to empower MLs in classrooms.

Empathy

Result of my dissertation study showed that "empathy" is a keyword in teaching that is the ability to imagine and understand how students might be thinking or feeling. My perspective on the importance of empathy in mathematics teaching is validated by the result of this study. Empathy is central to my teaching because I believe it enables teachers to truly care for their students. Participant teachers echoed my point of view about empathy. For example, Katherine said that

I grew up in a state in the Western United States, and my mom is Hispanic, so my mom is dark hair and dark eyes. I'm red-haired and blue eyes, so I'm very much the minority there in terms of look in this state. So, I feel like as a child, I had some experience with being the minority. Okay, just in terms of physical appearance only. I grew up with a lot of different cultures. This helped me understand that I have the privilege of being white. I feel like so many people just go through their world and day. I think I'm being culturally responsive but not realizing that individuals over there are experiencing life very differently than I do. So, I think it's important to be sensitive. I have a child who was adopted from China. My biggest concern for her was learning English. She knew it quickly; they just absorbed it. But what was more challenging for her after living in an orphanage for so long were these cultural nuances, going to school, and feeling accepted. Those kinds of things were more complicated than the language itself. So, I feel like I'm now in a predominantly white plate state. We are moving near my mom because my kid feels more comfortable with my family in the Western United State. Because she's Chinese, our white state primarily disconnects from the culture here. Because I've experienced this with my child and this feeling of disconnect. So, I tried to make my classroom accessible for everybody. I don't want anyone singled out, particularly these kids who are learning, because that's a big thing to come to school. And learning this language of math, this language of English, and then culture. These are so difficult. MLs go home to parents who are speaking a different language. In my class, I have kids who are not even with their parents, so they have all this going on in their families. So sometimes math is the last thing they even want to think about. You know, so I think there's so much going on with these kids, more than I can even possibly understand. I'm

> passionate about this to know about my MLs; I'm passionate about it because I'm passionate about teaching math to all. But then, I'm also passionate about the individual. Like I want these kids to succeed. And you know what I mean? I'm passionate about helping them achieve and learn math.

Katherine had experiences as feeling minority where she grew up and her daughter was adopted from China. So, Katherine has had firsthand experiences with her diverse background and her ML daughter. As seen in the quote above, her experiences helped her empathize with the MLs in her classroom and to be more culturally responsive to them. Another teacher, Emmy, said, "empathy is the key word when teaching mathematics to MLs…it is the word, what's missing in this planet". Thus, the key is empathy which helps to establish connections with students, understand them, and respond to their needs. However, to support MLs, teachers need the support of PD and resources that will increase their cultural competencies and awareness, especially for teachers who have never recognized the power the empathy and resources and practices for CRT. In these PD sessions, providing some exercises to make teachers notice their beliefs and perceptions about MLs and if they respect and value difference. The PD sessions should provide opportunities to teachers to practice taking another's perspective and imagining what other teachers are believing and thinking about teaching MLs. During the PD sessions they do role plays which can help them discuss their beliefs with others, and they can read different vignettes or case studies about different beliefs, perceptions, experiences, and strategies for teaching and engaging MLs will be very helpful for teachers to support their empathy development for their MLs.

Activating Prior Knowledge

During the interviews, I also observed that teachers who valued empathy in their teaching were eager to activate their students' prior knowledge by investigating their prior knowledge using multiple strategies (e.g., asking relevant questions) and connecting their prior knowledge to the current concept students were learning. This is not the case for only MLs. However, activating prior knowledge is more essential for MLs because English-speaking students also come from various backgrounds, but adding language to this variety complicates the situation (Hansen-Thomas, 2008). I also believe activating prior knowledge is a good practice of CRT. It can allow teachers to help MLs transfer their capital (academic, social, and cultural) to a different country to navigate and succeed in the new system (Kursav et al., 2022). When mathematics teachers value their students' capital (including their learnings, knowledge, or cultural values) and find ways to activate it, they also make MLs visible by ensuring they are reflected in the classroom environment. So, teachers learn not only about MLs' prior knowledge about the academic concepts but also about their interests, likes, dislikes, family members, and aspirations, which are critical to building relationships. I know from my teaching experiences also the best relationships are mutual, built on transparency and trust. Teachers also underlined this in the interviews. As teachers value their students' prior knowledge, values, or learning and learn about them more, they can provide a safer space where MLs can have a respectful dialogue about their knowledge, learning, values, and social issues germane to them (e.g., immigration, gender-relevant values approach, race relations, and cultural and religious norms). So, empathy sparks a domino effect, and it can lead to effective learning and teaching, especially through the activation of students' prior knowledge.

Culture

This research also showed that mathematics teachers' academic and emotional support for their students is critical in preparing them to be globally competent and successful citizens. Their support is vital to stabilize their students in an unpredictable and often prejudiced society. This can be achieved by understanding the students' varying differences and abilities. Most importantly, having a cultural awareness of who the students are, where they come from, and how this shapes their ability to learn in the classroom is very critical. Teachers need to know about their students' culture, which is the blueprint that influences how we think, feel, and behave. Culture is at the heart of everything we do. Without fully being aware, we are shaped as a society and incorporated into how we think, behave and communicate, what we believe in, and then, in turn, this shapes how we learn and teach (Gay, 2018). Culture describes "who we are as a person and connects to our knowledge, beliefs, and values" (Noel, 2018, p. 3). "Understanding cultural value systems can help identify similarities and differences between people from different cultures, from which intercultural communication can proceed. Like culture, values are learned; they are not innate or universal" (Neulip, 2015, p. 62). I believe that values are the evaluative part of beliefs and perceptions, so values help people to consider right or wrong according to the culture to which they belong. Values are learned through country, city, family, school, peers, and media subconsciously, so they are unique in every culture.

Recognizing cultural differences is a critical ability to improve competency and awareness in multicultural interactions (Chen, 2010). This research showed that teachers ranged across levels of cultural awareness: Parochial, Ethnocentric, Synergistic, and Participatory third cultures. Although a certain degree of ethnocentrism is needed for cultural survival, growing ethnocentrism can be a barrier to communication among people from different cultures (Neuliep

& McCroskey, 1997). The synergistic level shows a developmental process (Bennett 1984, 1986) about valuing cultural differences by understanding their own biases. However, the ideal highest level of awareness is the Participatory third culture level, which is all about understanding the cultural behaviors of others naturally and by working together with others to create a shared culture.

I believe that being in the participatory third culture level should be a goal of educators, not only mathematics teachers in middle grades or high schools but also us who are teacher educators. Being in the participatory third culture level is not easily achieved. When interviewing teachers, I also tried to recall some of my experiences with my students and place my experience on different levels. This helped me to reflect on my experiences to criticize my cultural competency in my teaching practices. I also captured in my own experiences and the teachers' interviews that as teachers intend to improve their cultural competence, they can (1) build bridges between students' experiences at home and school and between academic and socio-cultural realities. (2) use various instructional strategies considering students' backgrounds, (3) support students in knowing and praising their own and others' cultures, and (4) incorporate multicultural information, resources, and materials in the mathematics classroom. These results were also aligned with a description of the CRT practices stated by Gay (2000) and Ladson-Billings (2005). As Ladson-Billings (2005) also highlighted, to fulfill the characteristics of CRT, teachers should develop cultural awareness and continuously search for the best tools, strategies, and curricula to implement to meet the needs of their students. Additionally, it is essential to note that these results were auspicious because most of the participant teachers knew the importance of the CRT and their need to provide a culturally responsive learning experience and engage students.

While many teachers believe there is a vital link between teachers' culturally responsive teaching strategies and their student's learning and engagement in the mathematics classroom, teachers lack clear examples of resources and strategies for best CRT practices (Fiedler et al., 2008; Phuntsog, 2001). For example, Carol stated that:

> This year, not all my students can understand me in English decently well. So, they didn't know any English coming into my class. That was an interesting and challenging experience but kind of cool…I wanted to help them but did not know the various resources and strategies to support them.

School and district support for teachers is tremendously important as Griner and Stewart (2012) and Ortiz and Robertson (2018) highlighted those teachers (who have been supported by their schools and districts) can better be prepared to be equipped with the tools and strategies to enact a CRT. However, Griner and Stewart (2012) stated that implementing practically CRT practices in the classroom required a long-term commitment to figure out the most beneficial and meaningful ways to address the structures of diversity, equity, and inclusion and their belief cycles as teachers and humans. It is also the fact that the school is not the only setting for supporting teachers, so there is a need for larger societal structures (e.g., developing practical tools for CRT practice and providing professional development) at work to contribute to being knowledgeable about teaching and engaging MLs. This also requires collaboration with local and state community leaders and institutions (Ortiz & Robertson, 2018). I have been very impressed with the group of teachers I have worked with in this research because teachers showed that they are excited and eager to learn and engaged in learning and to improve their CRT practices, and willing to share their cultural competencies and awareness by reflecting on their own beliefs, perceptions, experiences, and strategies.

The Importance of Reflection

As I mentioned above, every moment of this research was an excellent opportunity to reflect on my teaching experiences and helped me overview my positionality as a scholar. Similarly, participant teachers shared that they had an opportunity to take their time and review their practices and reflect on their experiences as they answered the interview questions. I also would like to address that the interviews were scheduled for 30 minutes. All participants wanted to keep the interviews longer (approximately one hour) since they were saying they were having some aha moments, deep-thinking moments, and some pauses as they talked more and dug more into their ML classroom experiences with their MLs. As a researcher, it was a tremendous experience for me to observe teachers' reactions as they reflected on their beliefs, perceptions, experiences, and strategies. I believe these reflections were important for teachers and me and will significantly impact MLs' mathematics learning. This can be validated by Pultorak and Barnes (2009). They noted that when teachers can reflect on their own beliefs, perceptions, and experiences, they can create more socially-just circumstances for students. I observed that participant teachers liked to have an opportunity to consider their positionalities associated with their identities. I believe this recognition will help teachers be more prepared to lead for justice and equity and understand MLs' needs in their mathematics classes.

As they were reflecting, they were unpacking their own biases (Felton & Koestler, 2015) and were thinking about what CRT look like in their classrooms. As they reflected, they were synthesizing and critiquing what went well and what did not with their MLs when teaching mathematics. So, they were pushed to think further about their classroom practices regarding CRT.

Effective Teachers' Moves

The other question was asked to teachers about adjustments they make in their mathematics teaching considering their MLs. These adjustments include teachers' rate of speech, their use of colloquialisms, use of advanced academic terminology, use of some common words that have multiple or polysemous meanings, and use of words that sound the same but are spelled differently, use of homophones. When I was asking the question about these, I was imagining my own experiences and empathize with younger students in K12. Then I also reflected on my own teaching experiences and recognized how important to consider these adjustments in teaching and assignments. During the interviews, I heard two teachers with international learning experiences state that they adjust their pace, write terminology on the board, avoid slang, and provide enough wait time

As well as the moves above, one more move is the use of translanguaging in teaching. Using languages other than English when MLs need it is one of the translanguaging strategies that are the pedagogical practice of moving flexibly between different linguistic structures and systems (i.e., not only different languages and dialects, but also styles, registers, and other variations in language use) and different modalities (e.g., switching between speaking and writing, or coordinating gestures, body movements, facial expressions, visual images) (Tai, 2021). After spending much time in the relevant literature, I was not surprised to see that teachers were not feeling comfortable using translanguaging strategies in their mathematics teaching. Except for one teacher at the participatory third culture level, teachers were resisting systemic use of the translanguaging practices because this can impact ML's communication with their peers and teachers, so their learning and engagement. The literature also supported this. Dooly (2007) stated that some teachers might think linguistic diversity in the classroom can negatively impact students' learning. Also, Van Der Wildt et al. (2015) shared that using translanguaging might increase off-task talk and reduce proficiency in learning a new language. However, translanguaging is decisive for the joint construction of knowledge (Duarte, 2019). The translanguaging approach in the mathematics classroom initiates the MLs' linguistic repertoire. It converts them into sociolinguistic situations (García & Li, 2014), in which they experience to bridge between everyday language and academic language via translanguaging (Lin, 2012). This is a tremendous advantage for MLs since it contributes to their communication, learning, and engagement (García & Li, 2014). The use of translanguaging strategies creates a space for MLs by bringing together different sociocultural dimensions, social identities, beliefs, perceptions, experiences, and knowledge (Tai, 2021).

Participant teachers stated they sought the resources to provide their students with translated resources. They were trying to translate the words, context, or discussions if they also knew other languages. Amie stated that she had prepared her lesson plans in English and Spanish for her students when teaching Algebra and Geometry and preparedness activities in both languages. She also published them so that other teachers could use them in their mathematics teaching; García and Kleifgen (2010) said that translation plays "an important role in making meaning accessible for emergent bilinguals and fostering their English literacy development" (p.64). It is also essential to know that translanguaging is beyond translation, even though translation occurs during translanguaging activities. Williams (2002) mentioned that translation separates languages by emphasizing that one language is chosen academically; translanguaging allows both languages to be used and strengthened. Thus, comprehending translanguaging requires it "to have context and not just content, cognitive activity…and operate continuously" (Lewis et al., 2012, p. 667).

Teacher Expectations from MLs

My dissertation study showed that while teachers' beliefs and perceptions might affect how they interact with and approach their students, students' beliefs and perceptions can also impact their learning and engagement if they notice the different expectations set upon other students. Along with this, students can also be affected by the lack of cultural diversity in lessons and materials in the classroom. Not only do students feel underrepresented when the classroom environment is geared toward the teacher's culture, but there is a lack of understanding of the student's overall cultural identity. Students can develop apathy towards school and lose engagement when they see that their teacher does not believe in their ability to learn and succeed. Once this happens, misbehavior increases and discipline referrals are used to remove students from the classroom, which is counterproductive to the overall goals teachers have for their students. Again, consider teachers' and students' beliefs and perceptions that they may hold unconsciously.

Professional Development for Teachers

As I mentioned before that, empathy sparks the domino effect for teachers. However, not every teacher may empathize with MLs unless they notice their challenges in mathematics learning and had firsthand experiences as a bilingual or international learner. So, the presence of empathy can change the whole game in a good way. Then the question is what can be done to support teachers to develop the empathy needed to notice the challenges MLs face in the mathematics classroom. The answer is to provide collaborative relationships that allow teachers to share knowledge, experience, beliefs, and strategies with their peers through professional development (PD). A PD series in which teachers can have opportunities to share their CRT practices with their beliefs, perceptions, experiences, and strategies when teaching and engaging students and especially MLs. Continuous professional development for teachers have become an integral part of their path toward becoming effective teachers, starting with No Child Left Behind (NCLB) two decades ago and continuing with the passage of the Every Student Succeeds Act (ESSA) in 2015. The term "professional development" needs to include “activities that...are sustained (not stand-alone, 1-day, or short-term workshops), intensive, collaborative, job-embedded, data-driven, and classroom-focused” aimed to develop effective teachers (114th Congress, 2015, p.295). With the development of new technologies and the need to sustain continuous learning, the improved definitions of professional development required by federal regulations for teachers are promising in improving the teaching of mathematics and, as a result providing access to equitable resources for all. As part of the ESSA requirements, school districts, policymakers, and researchers started to inquire about what it means to provide effective PD.

PD is an ongoing process that needs to be consistent and sustained, whereas much of the offered PD is sporadic and disconnected. However, most school leaders focus on integrating PD, which directly contributes to improving standardized test results, and the effectiveness of PD offered in school settings. So, PDs are mostly about assessment and resources to improve the ways teachers teach mathematics. This is also necessary but secondary. I believe that the primary focus should be on grounding PD sessions in how to help teachers notice what they know, believe, perceive, and notice when teaching diverse students so that they can reflect on their belief systems, biases, and unconscious or conscious cultural incompetency and competency. In mathematics, continuous PD is crucial and has a long-lasting impact on mathematics teachers’ beliefs about their instruction, MLs’ achievement, and engagement if executed well (Harwel et al., 2000; Zambo & Zambo, 2008). Professional development is critical in making educational change; therefore, understanding the characteristics of successful PD is necessary (Desimone, 2011). A successful PD must facilitate deepening teachers' content knowledge and, in turn, MLs' learning of content. PD that provides opportunities for active learning that leads to change in classroom practices is also considered successful (Birman et al., 2000). A successful PD also consists of opportunities for teachers to observe, receive feedback, and work on ML assessments rather than be passive recipients of knowledge (Desimone, 2011). Furthermore, PD that is sustained and consistent over time results in change and has an enormous impact on teacher effectiveness (Boyle et al., 2005; Darling-Hammond, 1995) for teaching and engaging MLs. So, teachers' noticing of their beliefs and perceptions in teaching and engaging MLs can be supported and enhanced with rigorous PD activities that consider teachers' needs and follow the characteristics of effective PD to teach their MLs considering the CRT practices. So, what are the PD strategies that have been found successful in improving teachers' CRT for MLs to support their learning and engagement? So, to answer this question, in the light of my dissertation findings, I believed that the following strategies that Darling-Hammond & McLaughlin (1995) suggested are enormously important: (1) sustainable and intensive activities that are scaffolded through modeling, mentoring, and discussing problems encountered about teaching and engaging MLs (2) experiential learning that includes task-based activities such as teaching, assessment, and observations of MLs, (3) collaborative relationships that allow teachers to share knowledge with their peers about teaching and engaging MLs, (4) having a direct connection to teachers' own work in their classroom with their MLs, (5) being grounded in the teachers' own thoughts and questions, and (6) being connected to the overall school climate and plans for school improvement.

As it has been articulated through my results and findings from the survey data and the interviews, teachers' beliefs, perceptions, experiences, and strategies are shaped by their cultural awareness and impact their instructional practices. This study is an essential step in deeply investigating teachers' beliefs through mixed methods to provide both practical and theoretical implications for future research.

Delimitations of the Study

This study was delimited to only to 6th-12th grade mathematics teachers. This allowed for greater depth in the analysis only focusing on the content area of mathematics. The second delimitation is the decision to not to observe the classroom practices of teachers due to COVID. Another delamination was about generalizability. My representative sample of survey data came from Michigan, although there are participants from 35 different US states (approximately 60% and the rest of the states were less than 5%). Also, among 190 teachers, 79% of participants were female, 19% were male, 1% were non-binary, and 1% declined to state. Participants shared their races as white (86%), Asian (3%), African American (3%), Middle Eastern (1%), Native American (3%), Mixed (1%), and 3% of them declined to state their race. Additionally, teachers were asked if they were Latino or not; among these participants, 4% of them were, 93% were not Latino, and 3% of them declined to state. Because the results are primarily from one state and female teachers, it might be a limitation to generalize the results for all representative states. After survey collection, when teachers volunteered to join interviews. In the discussions, most of the data came from MI (22%) and Virginia (15%), while others (Rhode Island, Tennessee, Utah, Main, Nebraska, Texas, Chicago, Alabama, and New York) are less than (10%). Among these teachers, 7% were bilingual, while others were monolingual and came from the dominant culture. So, generalizability as a measure of how beneficial the results of a study are for a broader group of people or situations might be limited because of the minor variation between different states, so my results can be applicable but not broadly applicable to many kinds of teachers or situations.

Limitations of the Study

Strengths notwithstanding, there are some important limitations to this study that needs to be considered. First, this study was conducted with teachers from multiple states who may have gone through different teacher preparation programs. The findings from this study may be unique to states but not necessarily hold true to others. If seeking to apply these results to different states, one must consider the circumstances and context of the state/study when determining the transferability of its findings. Second, the study sample contained a small number of teachers. While the purpose of this study was to understand the mathematics' teachers' beliefs, practices, and strategies, the results are representative of self-reported responses. The results are not intended to be generalized without observing teachers' practices on a day-to-day.

My own experiences as a language learner may also be a limitation. In this respect, I spoke about my values and influences as a Turkish-American woman. The teachers' responses to my questions during the interview could have depended upon the degree to which they felt comfortable talking to me in a virtual environment without knowing me from before. While I believe I established trust with the teacher participants, there may still be an underlying apprehension to which I may not be aware of. However, given the richness of my data and openness of the teachers to be willing to be interviewed this limitation was minimal. Finally, as it relates to my interpretation of the data, I was fortunate to have feedback throughout my analysis from my advisor to whom I am grateful for.

CHAPTER 7: CONCLUSION AND IMPLICATIONS

As it has been articulated through my results and findings from both the survey data and the interviews, teachers' beliefs, perceptions, experiences, and strategies are shaped by their cultural awareness and impacts their instructional practices. This study is an important step in deeply investigating teachers' beliefs through mixed methods in order to provide both practical and theoretical implications for future research.

Results revealed that most of the participants were female (79%), white (86%), had masters' degree as the highest degree (77%), had more than ten years' experience (69%), and they had MLs in their classrooms (95%). Almost half of the 190 teachers stated that they knew how to choose and/or adapt materials that are appropriate for all of the MLs, and they are able to help MLs who have had interrupted education succeed in my mathematics classes.

My research showed that the most important thing to teach and engage MLs is "empathy" which is a way of connecting with other that shows you understand that they're experiencing something meaningful. It is a very important tool for teachers that help them comprehend how MLs learn and engage and find strategies to connect and collaborate. It is immensely important to note that being empathetic is not lowering the expectations from MLs. While MLs' teachers have empathy for their MLs, they can hold them to high standards. It is the fact that for MLs feeling understood and supported by their teachers is important because it supports their engagement, motivation, self-awareness, self-advocacy and self-determination.

For teaching and engaging MLs in mathematics classroom, we need to link: policy, theory, and practice. There has been a major challenge: there are gaps between what researchers and policy makers say works and what is being implemented in classrooms (Petrina, 2004; Tabak, 2006). So, the solution is: there is a need for a collaboration between policy, practice, and people to merge this gap (Klingner et al., 2005). The gap can be started to be filled by providing professional development for mathematics teachers of MLs.

Teachers have the most influence on ML success (as compared to curriculum and resources), therefore PD is critical in increasing teaching practices and eventually leading to improved and changed pedagogy (Stewart, 2014). PD allows teachers to improve their everyday practices (Lawless & Pellegrino, 2007). Considering the results of this stud, I can say that when teachers have PD opportunities about teaching and engaging MLs, they can have a better motivation to teach and improve themselves with a stronger sense of efficacy. With a stronger self-efficacy due to the PD opportunities, teachers would feel more confident in allocating time to plan, design, and organize appropriate learning materials for MLs and try new strategies (Goddard et al., 2000). With increased motivation and confidence, teachers may be in a better position to support their MLs' learning and engaging in mathematics classrooms. For the purposes of the PD about teaching and engaging MLs, we have to keep in mind teachers still continue to learn with the support of learning communities, peer coaching, collaboration, and observations. MLs' teachers who look forward to finding ways for professional improvement can desire to learn new learning strategies or techniques. They can enjoy participating in different learning activities such as problem-solving activities, workshops, discussion sessions with other teachers (Trotter, 2006). With the learning activities, MLs' teachers can improve their skills and gain more knowledge as they interact and collaborate with other teachers. PD activities can help them to have opportunities for concrete experiences, consulting, support, and feedback from peers (Knowles, 1990). Having a professional learning community including a group of educators meets for professional development to share their experiences and collaborate with others to ameliorate teaching of MLs skills. Professional learning communities should aim to help teachers to improve the skills and knowledge through collaboration, professional experiences change and dialogue, and dedications and aspirations in their teaching (Davis et al., 2017). Members of the professional community cam question, reevaluate, refine as they continue their goal-driven exchanges and professional development in their learning communities in their PD sessions. Teachers can come together with a shared goal and responsibilities and reflect on their beliefs, perceptions, experiences, and strategies for teaching and engaging MLs. I also believe that the best approach to executing a successful PD at a school lies in a collaborative approach that regards teachers as decision-makers in what their needs are and make autonomous decisions on improving their CRT practices for MLs, and so all students. Establishing a community of learners that are school based would allow teachers to run continuous PD by being able to sustain it even when there is no centralized control from the administration.

Another solution to support teachers of MLs designing curricula that support improving MLs' learning and engagement. A curriculum that puts ML learning at its forefront has the following characteristics (1) It is thoughtfully planned, involving a multi-stage process that recognizes differing contexts, (2) It is collaborative, (3) It is centered on overarching understandings in the written curriculum, (4) It is culturally responsive, (5) It promotes positive outcomes for all children. (Glatthorn et al., 2009. p. 4). In implementing a curriculum, first, the learning outcomes within the curriculum should be aligned with culturally responsive instructional practices. Then, resources should be integrated to meet diverse learner needs (Glatthorn et al., 2009). Frey (2001) outlines that teacher should be provided with consistent and sustained support with PD as they implement a curriculum through (1) Review: What is working? What concerns should be addressed?, (2) Initiate: What needs to be changed? What strategies should be used?, (3) Plan. What steps do we need to take to prepare for change?, (4) Develop: How can we keep development work on track?, and (5) Implement. How do we work together to make the changes?, and (6) Maintain: How can we provide the best programming for MLs? (Brooks, 2006).

The result of the study can help practitioners of MLs to understand the importance of reflection in their teaching and raise the critical consciousness of teachers on cultural responsiveness. Also, the study can help policymakers to recognize that pacing and covering required units in the curriculum is not enough. Still, there needs to be efficient teaching of mathematics by culturally responsive teachers. I hope that my dissertation study will be a valuable asset to the field of education and help shed light on the experiences of mathematics teachers in teaching MLs for practitioners, policymakers, and teacher education programs.

Future Research

I plan on using the findings from my dissertation study and plan future studies that will involve intervention and professional development for mathematics teachers of MLs. I would like to establish partnerships with local K-12 schools and focus on MLs' engagement.

APPENDICES

Appendix A: Interview Question

- What is your experience in teaching MLs?
- What are the components of effective instruction for MLs?
- How do you engage, involve, and communicate with MLs in your mathematics classroom?
- How do you modify your mathematics curriculum, lessons, activities, and assessments to make these accessible for MLs? What strategies do you use?
- Can you describe your successes and challenges in teaching MLs?
- How do you see your education experience contributing to MLs' mathematics learning?
- Based on our conversation with you: Please explain what you were thinking. Why do you have the specific teacher move? How does this example reflect your beliefs or prior experiences with MLs?

Appendix B: SIOP Protocol

The Sheltered Instruction Observation Protocol (SIOP) (Echevarria, Vogt, & Short, 2000; 2004; 2008)

Observer:	Teacher:
Date:	School:
Grade:	Class/Topic:
ESL Level:	Lesson: (check one) ☐ Multiday ☐ Single-day

Directions: Check the box that best reflects what you observe in a sheltered lesson. You may give a score from 0-4 (or NA on selected items). Cite under *Comments* specific examples of the behaviors observed.

	Highly Evident		Somewhat Evident		Not Evident	
Lesson Preparation	**4**	**3**	**2**	**1**	**0**	**NA**
1. **Content objectives** clearly defined, displayed, and reviewed with students	☐	☐	☐	☐	☐	
2. **Language objectives** clearly defined, displayed, and reviewed with students	☐	☐	☐	☐	☐	
3. **Content concepts** appropriate for age and educational background level of students	☐	☐	☐	☐	☐	
4. **Supplementary materials** used to a high degree, making the lesson clear and meaningful (e.g., computer programs, graphs, models, visuals)	☐	☐	☐	☐	☐	
5. **Adaptation of content** (e.g., text, assignment) to all levels of student proficiency	☐	☐	☐	☐	☐	☐
6. **Meaningful activities** that integrate lesson concepts (e.g., surveys, letter writing, simulations, constructing models) with language practice opportunities for reading, writing, listening, and/or speaking	☐	☐	☐	☐	☐	

Comments:

Building Background	**4**	**3**	**2**	**1**	**0**	**NA**
7. **Concepts explicitly linked** to students' background experiences	☐	☐	☐	☐	☐	☐
8. **Links explicitly made** between past learning and new concepts	☐	☐	☐	☐	☐	
9. **Key vocabulary** emphasized (e.g., introduced, written, repeated, and highlighted for students to see)	☐	☐	☐	☐	☐	

Comments:

Comprehensible Input	**4**	**3**	**2**	**1**	**0**	**NA**
10. **Speech** appropriate for students' proficiency level (e.g., slower rate, enunciation, and simple sentence structure for beginners)	☐	☐	☐	☐	☐	
11. **Clear explanation** of academic tasks	☐	☐	☐	☐	☐	
12. **A variety of techniques** used to make content concepts clear (e.g., modeling, visuals, hands-on activities, demonstrations, gestures, body language)	☐	☐	☐	☐	☐	

Comments:

Strategies	**4**	**3**	**2**	**1**	**0**	**NA**
13. Ample opportunities provided for students to use **learning strategies**	☐	☐	☐	☐	☐	
14. **Scaffolding techniques** consistently used assisting and supporting student understanding (e.g., think-alouds)	☐	☐	☐	☐	☐	

	4	3	2	1	0	NA
15. A variety of **questions or tasks that promote higher-order thinking skills** (e.g., literal, analytical, and interpretive questions)	☐	☐	☐	☐	☐	

Comments:

Interaction	**4**	**3**	**2**	**1**	**0**	**NA**
16. Frequent opportunities for **interaction** and discussion between teacher/student and among students, which encourage elaborated responses about lesson concepts	☐	☐	☐	☐	☐	
17. **Grouping configurations** support language and content objectives of the lesson	☐	☐	☐	☐	☐	
18. Sufficient **wait time for student responses** consistently provided	☐	☐	☐	☐	☐	
19. Ample opportunities for students to **clarify key concepts in L1** as needed with aide, peer, or L1 text	☐	☐	☐	☐	☐	☐

Comments:

Practice and Application	**4**	**3**	**2**	**1**	**0**	**NA**
20. **Hands-on materials and/or manipulatives** provided for students to practice using new content knowledge	☐	☐	☐	☐	☐	☐
21. Activities provided for students to **apply content and language** knowledge in the classroom	☐	☐	☐	☐	☐	☐
22. Activities integrate all **language skills** (i.e., reading, writing, listening, and speaking)	☐	☐	☐	☐	☐	

Comments:

Lesson Delivery	**4**	**3**	**2**	**1**	**0**	**NA**
23. **Content objectives** clearly supported by lesson delivery	☐	☐	☐	☐	☐	
24. **Language objectives** clearly supported by lesson delivery	☐	☐	☐	☐	☐	
25. **Students engaged** approximately 90% to 100% of the period	☐	☐	☐	☐	☐	
26. **Pacing** of the lesson appropriate to students' ability level	☐	☐	☐	☐	☐	

Comments:

Review and Assessment	**4**	**3**	**2**	**1**	**0**	**NA**
27. Comprehensive **review of key vocabulary**	☐	☐	☐	☐	☐	
28. Comprehensive **review of key content concepts**	☐	☐	☐	☐	☐	
29. Regular **feedback** provided to students on their output (e.g., language, content, work)	☐	☐	☐	☐	☐	
30. **Assessment of student comprehension and learning** of all lesson objectives (e.g., spot checking, group response) throughout the lesson	☐	☐	☐	☐	☐	

Comments:

Total Points Possible: 120 (Subtract 4 for each NA given)

Total Points Earned: **Percentage Score:**

Appendix C: Survey

Demographic Information

Please specify grade span as a mathematics teacher

☐ Early Childhood ☐ Elementary ☐ Middle ☐ High

Have you received any training on MLs?

☐ Yes
☐ No
☐ Other, please specify

Has your training on MLs helped you better support all of your students (both MLs and non-MLs)?

☐ Yes, it has.
☐ No, but it has helped me better support MLs.
☐ No, the training was not helpful at all.
☐ Not applicable

Where did you receive your training?

☐ An institute of higher education (e.g., MSU, or any other university or colleges)
☐ An alternative pathway (e.g., The Learning Community)
☐ Michigan Department of Education (MDE) promoted professional development workshops
☐ In-district professional development
☐ My own, self-directed study (e.g., purchased books, watched webinars, etc.)
☐ Not applicable

In what school district do you work? Please specify ☐ Decline to State

Please list any languages, other than English, with which you are fluent and the degree of your fluency in each language (reading, writing,speaking).

	Not at all	Not very	Somewhat	Flue	Very
	○	○	○	○	○
	○	○	○	○	○
	○	○	○	○	○
	○	○	○	○	○

What is your race? (Select one or more):

☐ Black or African American
☐ Alaska Native or American Indian
☐ Asian
☐ Native Hawaiian or Other Pacific Islander
☐ White
☐ Other
☐ Decline to State

Do you identify as Hispanic/Latino?

☐ Yes
☐ No
☐ Decline to State

What is your gender?
☐ Female
☐ Male
☐ Decline to State
What is your highest level of education?
☐ Bachelors
☐ Masters
☐ Doctorate
☐ Other
How long have you worked in the field of mathematics education?
☐ Less than 1 year
☐ 1 - 3 years
☐ 4 - 6 years
☐ 7 - 10 years
☐ More than 10 years
How many years have you been at your current position?
☐ Less than 1 year
☐ 1 - 3 years
☐ 4 - 6 years
☐ 7 - 10 years
☐ More than 10 years

In your school, which Language Assistance Programs are currently used? (Check all that apply)
☐ English as Second Language (ESL) pull-out
☐ ESL push-in
☐ English as a Second Language as a separate content area course
☐ Dual language immersion (one way or two way)
☐ Sheltered Content Instruction
☐ Newcomer program
☐ Collaborative ESL and general
☐ Transitional bilingual
☐ Other (please specify) ________________________
☐ I don’t know
In your school, which staff members are primarily responsible for the education of MLs? (Check all that apply)
☐ ML teacher(s)
☐ Assistant principal(s)
☐ Principal
☐ General education teacher(s)
☐ ML teacher assistant(s)
☐ Special Education teachers
☐ Other (please specify) ______________________________

Your Experience with MLs

Have you ever had MLs in your classes?
○ Yes

○ No
○ NA

Do you have MLs in your classes now?

○ Yes
○ No
○ NA

I can conduct my classes in ways that help students understand the material regardless of language ability.

☐ Strongly agree
☐ Agree
☐ Neither agree nor disagree
☐ Disagree
☐ Strongly disagree

All items below will include the Strongly agree, agree, neither agree nor disagree, disagree, and strongly disagree multiple choose section.

1. I know how to develop content and language objectives from mathematics standards.
2. It is not possible to be equally proficient in more than one language in mathematics classroom.
3. Parents of MLs who don't speak English after having been in America for a long time are probably incapable of ever mastering English.
4. MLs are retained too long in bilingual classrooms at the expense of English acquisition.
5. If MLs develop literacy in their first language it will facilitate the development of reading andwriting in English.
6. If MLs are able to use their L1 (native language) they can access mathematics content more easily.
7. Cultural differences enrich the lives of members of communities.
8. I can (could) adapt my mathematics instruction so that MLs can master the material.
9. I know how to select and use assessment accommodations that are appropriate for MLs.
10. In my building, MLs are (would be) viewed as problems.
11. In my building, MLs are (would be) viewed as assets.
12. MLs have (would have) a difficult time relating to non-MLs in my mathematics classes.
13. MLs have (would have) a difficult time relating to non-MLs in my building.
14. My building reflects a multilingual/multicultural population.
15. My mathematics instruction materials reflect the cultural diversity of my students.
16. Learning in one's first language interferes with learning in a second language.
17. ML students (would) take up more of my class time than do (would) non-ML students.
18. I am (would be) good at helping students who are ML understand the material in my mathematics classes.
19. Research remains inconclusive about the benefits of bilingual education.
20. ML students will do better in school if they learn to read and write in their first language.
21. Continuing to speak their home language and not English is an indication that the parents of MLs want to preserve their home culture.
23. In my building, ML parents are (would be) welcomed as valuable contributors to our school's learning community.

24. MLs should be tested in their native language.
25. In our school, we review data regularly to inform mathematics instruction for MLs.
26. When looking at data, it is disaggregated to analyze the results of MLs compared to their non- ML peers.
27. If an achievement gap between MLs and their peers is identified, we work to develop a plan of action to support MLs to try to close the achievement gap in mathematics.
28. In our school, we regularly meet to discuss strategies to help MLs access grade level mathematics content.
29. When making decisions about mathematics curriculum, our school always considers how it may impact the learning experiences of our MLs.
30. The Bilingual/ESL Teacher Assistants (would) effectively support the attainment of mathematics content objectives for the ML students enrolled in my classroom.
31. The Bilingual/ESL Teacher Assistants (would) effectively support English language acquisition of ML students enrolled in my classroom.
32. ML students are (would be) a welcome addition to my mathematics classroom.
33. I possess the knowledge and skills necessary to teach the mathematical content areas I have been assigned.
34. All else equal, the more that ML children are exposed to English, the more English they will learn.
35. MLs' inability to express themselves in English indicates that they do not understand the material in mathematics classroom.
36. Conflicts (would) sometimes arise between ML and non-ML students in my mathematics classes.
37. The district's Bilingual/ESL services support my instructional needs.
38. The district's administration understands the needs of MLs.
39. The district provides professional development opportunities specific to supporting MLs.
40. The district's professional development for MLs has helped me grow as a professional.
41. The district/school provides appropriate resources to support the instruction of MLs.
42. The district/school allocates appropriate staffing to support the instruction of MLs.
43. I know the grant funding that is available in the state and district to support the education of MLs.
44. If I need information (e.g., documents, report card, phone call) translated, I know where to go for support.
45. I have received training on how to support MLs specifically for my professional role.
46. I feel (would feel) confident coaching a teacher on how to support MLs in his/her classroom.
47. I know the difference between content and language objectives.
48. I know how the language assistance program in my district is evaluated.
49. All things considered; I would rather not have ML students in my mathematics

classes.

50. ML students' English language fluency is strongly related to how well they can understand concepts in mathematics.
51. A student cannot be referred to special education due to his/her limited English proficiency.
52. The student's home culture and language should be considered in the special education evaluation process.
53. Through careful evaluation, it is possible to distinguish between language difference and learning disabilities.
54. If an English learner has a disability, there is no need to provide language support because special education service will cover the student's learning needs.
55. English learners with disabilities should not be encouraged to retain their native languages because developing both home language and English is too challenging for them.
56. The multidiscipline team should have a professional who has knowledge or expertise regarding language and culture of the student and family.
57. An interpreter must be presented in all formal parent meetings.
58. There is a need to have a PD on understanding difference between language acquisition and learning disabilities.
59. There is a need to have a PD on special education evaluation for English learners.
60. There is a need to have a PD on developing culturally and linguistically responsive IEPs.
61. There is (would be) little conflict between ML and non-ML students in my classes.
62. The district's Bilingual/ESL program (would) regularly make resources and materials available for use in classrooms.
63. I know how to teach learning strategies to my students that will help them master the material.
64. The use of the first or native language at home interferes with the speed and efficiency of second language acquisition
65. I am (would be) able to help students who have had interrupted education succeed in my mathematics classes.
66. There is a critical age after which it becomes impossible to completely master a second language (reading, writing, and speaking).
67. ML students probably prefer learning in cooperative and collaborative settings rather than learning independently, or in a pull-out tutorial.
68. Higher levels of bilingualism can lead to practical, career-related advantages.
69. It is easier to teach ML students mathematics functions and operations than it is to teach them concepts in such areas as literature and social studies.
70. I am (would be) well prepared to work with students with limited/interrupted formal education (SLIFE) in my classroom.
71. I know how to choose and/or adapt materials that are appropriate for all of my students.
72. Parents of MLs believe that it is more important for their children to learn English than to maintain their native language.

73. I know the rights of MLs' parents with regard to opting out of services.
74. The primary use of assessment should be to determine children's abilities or performance.
75. Cultural/ethnic differences are no barrier to the ability of families to work and socialize together.
76. ML/SLIFE students (would) drain time and school resources away from non-ML students.
77. My school administration fully supports the concept of Bilingual/ESL education for ML students.
78. I (would) like to have ML students in my classes.
79. If I were to receive an ML or SLIFE student in my classroom, I feel (would feel) confident that I will (would) be able to adapt classroom instruction to meet his/her needs.
80. Parents of MLs are just as involved in the schools as are parents of non-MLs.
81. Cultural groups are equal in how much they care about and support their children.
82. In my building, the majority of my colleagues believe that MLs should not be given any special services.
83. The primary use of assessment should be to determine areas for students' improvement.
84. MLs in my classes (would) spend as much time with non-MLs as they (would) do with other MLs.
85. MLs (would) require no more classroom and other school resources than do (would) non-MLs.
86. I (would) prefer not to have ML students in my classes.
87. My school has a system in place for monitoring the English proficiency levels of MLs.
88. I understand how MLs are identified.
89. I receive information about newly identified MLs.
90. I understand how MLs exit the language assistance program in my district/school.
91. I understand how MLs exit the ML identification in the state of RI.
92. I receive information about newly exited MLs.
93. In my district, communication is strong between the initial enrollment and registration process through the time a student enters the classroom.
94. In my building, I know who reach out to if I need support working with an ML.
95. In my building, the social and emotional needs of our MLs are met.

What would you need to know more about in order to better serve the educational and developmental needs of MLs? Check all that apply.

- ○ Identifying MLs
- ○ Monitoring the English proficiency levels of MLs
- ○ Monitoring the academic progress of MLs
- ○ Engaging the parents of MLs
- ○ Implementing response to intervention (RTI/MTSS) services with MLs

◯ Implementing ML instructional models as they are intended to be implemented ◯ Making time for general education teachers to collaborate with ML teachers ◯ Finding appropriate resources to support the education of MLs ◯ The "tools" or instruments to identify students with limited/interrupted formal education (SLIFE) ◯ Ways that I can use the cultural and linguistic resources of MLs to teach my English monolingual students about another language or culture. ◯ The history, culture, and arts of ML students' home culture ◯ Ways that I can infuse and enrich my curriculum with the diversity of the global community's cultures and languages ◯ Teaching the English language reading and language arts to pre-literate ML students ◯ Other (please describe)
Rank the following topics to indicate the areas in which you would like to receive professional development. (Use 1 to indicate the topic you are most interested in and 7 to indicate the topic you are least interested in.) ☐ The Sheltered Instruction Observation Protocol (SIOP) Model (research-based and validated instructional model) ☐ Guided Language Acquisition Design - GLAD (professional development model in the area of academic language acquisition and literacy.) ☐ Integrating Social Emotional Learning (SEL) into academics ☐ Culturally responsive education practices ☐ Family and community involvement strategies ☐ The WIDA English Language Development Standards ☐ Using assessments to identify levels of proficiency and guide instruction ☐ Embedding technology into instruction for MLs
Culturally Responsive Teaching
1. I include lessons about the acculturation process in my mathematics classroom. ☐ Never ☐ Rarely ☐ Sometimes ☐ Usually ☐ Always All items below will include the never, rarely, sometimes, usually, and always multiple choose section. 2. Examine mathematics class materials for culturally appropriate images and themes. 3. I ask students to compare their culture with American culture in some in my mathematics classes. 4. I make an effort to get to know my students' families and backgrounds. 5. I learn words in my students' native languages in my mathematics classes. 6. I use mixed-language and mixed-cultural pairings in group work in my mathematics

classes.

7. I use peer tutors or student-led discussions in my mathematics classes.
8. I use surveys to find out about my students' classroom preferences.
9. I elicit students' experiences in pre-reading and pre-listening activities.
10. I encourage students to speak their native languages with their children.
11. I have students work independently, selecting their own learning activities.
12. I spend time outside of class learning about the cultures and languages of my students.
13. I include lessons/problems about anti-immigrant discrimination or bias.
14. I supplement the curriculum with lessons about international events.
15. I ask for student input when planning lessons and activities.
16. I encourage students to use cross-cultural comparisons when analyzing material.
17. I provide rubrics and progress reports to students.

Appendix D: IRB Forms

- Consent for Survey

  You are being asked to participate in a research study. The purpose of the study is to explore the beliefs, perceptions, experiences, and strategies of 6^{th} and 12^{th} grades mathematics teachers in teaching and engaging English Learners (MLs) in mathematics classrooms. You will be asked to respond to the survey questions. Your participation is voluntary. You can skip any question you do not wish to answer or withdraw at any time. You must be 18 or older to participate. If you have any questions, please contact Merve N. Kursav, at kursavme@msu.edu or Dr. Corey Drake at cdrake@msu.edu. You indicate that you voluntarily agree to participate in this research study by submitting the survey.

  Signature and Date:

- Consent for Interview

  You are being asked to participate in an interview research study. The purpose of the study is to explore the beliefs, perceptions, experiences, and strategies of 6^{th} and 12^{th} grades mathematics teachers in teaching and engaging English Learners (ELs) in mathematics classrooms in the US. You will be asked to respond to the interview questions. There are no significant risks for participating in the study. Your participation is voluntary. You can skip any question you do not wish to answer or withdraw at any time. You must be 18 or older to participate. Interviews will be recorded and transcribed. The transcripts will be stored separate from any identifiable information. If you have any questions, please contact Merve N. Kursav, at kursavme@msu.edu or Dr. Corey Drake at cdrake@msu.edu.

Your signature below means that you voluntarily agree to participate in this research study.

Signature and Date:

REFERENCES

REFERENCES

Abdulrahim, N. A., & Orosco, M. J. (2020). Culturally responsive mathematics teaching: A research synthesis. *The Urban Review*, *52*(1), 1-25.

Aguirre, J. M., & del Rosario Zavala, M. (2013). Making culturally responsive mathematics teaching explicit: A lesson analysis tool. *Pedagogies: An International Journal*, *8*(2), 163-190.

Ainley, M. D. (2001). Interest in learning and classroom interaction. In D.J. Clarke (Ed.), *Perspectives on practice and meaning in mathematics and science classrooms* (pp. 105-130). Dordrecht, The Netherlands: Kluwer.

Anderman, E. M., Eccles, J. S., Yoon, K. S., Roeser, R., Wigfield, A., & Blumenfeld, P. (2001). Learning to value mathematics and reading: Relations to mastery and performance oriented instructional practices. *Contemporary Educational Psychology, 26*(1), 76-95.

Archambault, I., Janosz, M., & Chouinard, R. (2012). Teacher beliefs as predictors of adolescents' cognitive engagement and achievement in mathematics. *The Journal of Educational Research*, *105*(5), 319-328.

Averill, R., Anderson, D., Easton, H., Te Maro, P., Smith, D., & Hynds, A. (2009). Culturally responsive teaching of mathematics: Three models from linked studies. *Journal for Research in Mathematics Education*, *40*(2), 157-186.

Barwell, R., Moschkovich, J., & Setati Phakeng, M. (2017). Language diversity and mathematics: Second language, bilingual, and multilingual learners. *Compendium for Research in Mathematics Education*, 583-606.

Basturkmen, H. (2012). Review of research into the correspondence between language teachers' stated beliefs and practices. *System*, *40*(2), 282-295.

Bennett, J. M. (1986). Modes of cross-cultural training: Conceptualizing cross-cultural training as education. *International Journal of Intercultural Relations*, *10*(2), 117-134.

Bennett, M. J. (1998). Intercultural communication: A current perspective. *Basic concepts of intercultural communication: Selected readings*, *1*, 1-34.

Beswick, K. (2012). Teachers' beliefs about school mathematics and mathematicians' mathematics and their relationship to practice. *Educational Studies in Mathematics*, *79*(1), 127-147.Birman, B., Desimone, L., Porter, A., & Garet M. (2000). Designing professional development that works. *Educational Leadership*, 57(8), 28-33.

Blair, E. (2015). A reflexive exploration of two qualitative data coding techniques. *Journal of Methods and Measurement in the Social Sciences*, *6*(1), 14-29.

Boaler, J., & Staples, M. (2008). Creating mathematical futures through an equitable teaching approach: The case of Railside School. *Teachers College Record, 110*(3), 608–645.

Booth, L., & Graves, B. A. (2018). Service-learning initiatives in rural populations: Fostering cultural awareness. *Online Journal of Rural Nursing and Health Care*, *18*(1), 90-111.

Borg, S. (1997). *Unifying concepts in the study of teachers' cognitive structures.* Unpublished manuscript.

Borg, S. (1999). Studying teacher cognition in second language grammar teaching. *System*, *27* (1), 19-31.

Borg, S. (2011). The impact of in-service teacher education on language teachers' beliefs. *System*, *39*(3), 370-380.

Borg, S. (2003). Teacher cognition in language teaching: A review of research on what language teachers think, know, believe, and do. *Language teaching*, *36*(2), 81-109.

Bose, A., & Choudhury, M. (2010). Language Negotiation in a Multilingual Mathematics Classroom: An Analysis. *Mathematics Education Research Group of Australasia*.

Bourdieu, P. 1977. *Outline of a theory of practice*. Cambridge, England: Cambridge University Press.

Boyle, B., Lamprianou, I. and Boyle, T. 2005. A longitudinal study of teacher change: what makes professional development effective. Report of the second year of the study. *Journal of School Effectiveness and School Improvement, 16*(1): 1–27.

Brennan, R. L. (1991). Statistical models for behavioral observations: a review. *Journal of Educational Statistics*, *16*(3), 253-266.

Breen, M. P. (1991). Understanding the language teacher. In R. Phillipson, E.S. Kellerman, Slinker M.S., M.S. Sharwood, and Swain (eds). Foreign/Second Language Pedagogy Research (p. 213-233). Clevedon UK: Multilingual Matters.

Brooks, C. (2006). Curriculum cycle: Effective implementation. Paper presented to *the College of Alberta School Superintendents* in March 2006. Alberta Education: Author.

Buehl, M. M. & Beck, J. S. (2015). The relationship between teachers' beliefs and teachers' practices. In H. Fives & M. G. Gill, (Eds.). *The Handbook of Research on Teachers' Beliefs* (p. 66-84). New York, NY: Routledge.

Carnoy, M., & Rothstein, R. (2013). *What do international tests really show about U.S. student performance?.* Washington, DC: Economic Policy Institute.

Carreón, G. P., Drake, C., & Barton, A. C. (2005). The importance of presence: Immigrant parents' school engagement experiences. *American Educational Research Journal*, *42*(3), 465-498.

Cattell, R. B., & Vogelmann, S. (1977). A comprehensive trial of the scree and KG criteria for determining the number of factors. *Multivariate Behavioral Research*, *12*(3), 289-325.

Chapman, C. L., & De Castro, J. M. (1990). Running addiction: measurement and associated psychological characteristics. *The Journal of sports medicine and physical fitness*, *30*(3), 283-290.

Chen, G. M. (2010). The impact of intercultural sensitivity on ethnocentrism and intercultural communication apprehension. *Intercultural Communication Studies*, *19*(1), 1-9.

Chen, G. M., & Starosta, W. J. (1996). Intercultural communication competence: A synthesis. *Communication Yearbook, 19*, 353-384.

Civitillo, S., Juang, L. P., Badra, M., & Schachner, M. K. (2019). The interplay between culturally responsive teaching, cultural diversity beliefs, and self-reflection: A multiple case study. *Teaching and Teacher Education*, *77*, 341-351.

Civitillo, S., Juang, L. P., & Schachner, M. K. (2018). Challenging beliefs about cultural diversity in education: A synthesis and critical review of trainings with preservice teachers. *Educational Research Review, 24*, 67-83.

Coggins, D. (2014). *English Learners in the Mathematics Classroom*. Corwin Press.

Cook, S. D., & Brown, J. S. (1999). Bridging epistemologies: The generative dance between organizational knowledge and organizational knowing. *Organization science*, *10*(4), 381-400.

Corno, L., & Mandinach, E. B. (1983). The role of cognitive engagement in classroom learning and motivation. *Educational psychologist*, *18*(2), 88-108

Creswell, J. W., & McCoy, B. R. (2011). The use of mixed methods thinking in documentary development. In *The handbook of emergent technologies in social research* (pp. 453-468). Oxford University Press.

Cummins, J. (1997). Cultural and linguistic diversity in education: A mainstream issue?. *Educational Review*, *49*(2), 105-114.

Cummins, J. (2005, September). Teaching for cross-language transfer in dual language education: Possibilities and pitfalls. In *TESOL Symposium on dual language education: Teaching and learning two languages in the EFL setting* (pp. 1-18). Istanbul: Universidad BogaziciTurquía

D'Ambrosio, B. S., & Kastberg, S. E. (2008). *Strategies to promote equity in mathematics* *education*. In Cole, R. (2008). Ed. Educating everybody's children: Diverse teaching strategies for diverse learners, p. 123-150.

Darling-Hammond, L. & McLaughlin, M.W. (1995). Policies that support professional development in an era of reform. *Phi Delta Kappan*, 76(8), 597-604.

Darlington, R.B, & Hayes, A.F. (2017). *Regression analysis and linear models: Concepts, applications, and implementation.* New York: The Guilford Press.

Davis, J. D., Choppin, J., Roth McDuffie, A., & Drake, C. (2017). Middle school mathematics teachers' perceptions of the common core state standards for mathematics and its impact on the instructional environment. *School Science and Mathematics*, *117*(6), 239-249.

de Araujo, Z., Roberts, S. A., Willey, C., & Zahner, W. (2018). English learners in K–12 mathematics education: A review of the literature. *Review of Educational Research*, *88*(6), 879-919.

Debnam, K. J., Pas, E. T., Bottiani, J., Cash, A. H., & Bradshaw, C. P. (2015). An examination of the association between observed and self-reported culturally proficient teaching practices. *Psychology in the Schools*, *52*(6), 533-548.

Desboulets, L. D. D. (2018). A review on variable selection in regression analysis. *Econometrics*, *6*(4), 45.

Desimone, L.M. (2011). A primer on effective professional development. *Phi Delta Kappan*, 92(6), 68-71.

Dolezal, S. E., Welsh, L. M., Pressley, M., & Vincent, M. M. (2003). How nine third- grade teachers motivate student academic engagement. *Elementary School Journal, 103(*3), 239-267.

Dooly, M. (2007). Constructing diversity: Teachers' perspectives on classrooms in Catalonia. *Catalan Review*, *21*(1), 207-230.

Driver, M. K., & Powell, S. R. (2017). Culturally and linguistically responsive schema intervention: Improving word problem solving for English language learners with mathematics difficulty. *Learning Disability Quarterly*, *40*(1), 41-53.

Duarte, J. (2019). Translanguaging in mainstream education: a sociocultural approach. International Journal of Bilingual Education and Bilingualism, 22(2), 150-164.

Duncan, G., & Murnane, R. (2012). *Whither opportunity? Rising inequality, schools and Children's life chances.* New York: Russell Sage Foundation.

Echevarria, J., Vogt, M., & Short, D. (2008). Making content comprehensible for English learners: The SIOP model.

Education Commission of the States (ECS). (2014). Education Trends. Retrieved from http://mb2.ecs.org/reports/Report.aspx?id=900

Ellis, M. (2019). *Knowing and Valuing Every Learner: Culturally Responsive Mathematics Teaching.* Curriculum Associates, LLC. Retrieved from: https://www.curriculumassociates.com/-/media/mainsite/files/ready-classroom-mathematics/ready-classroom-mathematics-cultural-responsiveness-whitepaper-2019.pdf

Ellis-Robinson, T., & Wayde-Coles, J. (2021). School, University, and Community Collaboration to Promote Equity through Inclusive Cultural Competence. *Education Policy Analysis Archives*, *29*.

Engle, R. A. (2012). The productive disciplinary engagement framework: Origins, key concepts, and developments. In *Design research on Learning and Thinking in Educational Settings* (pp. 170-209). Routledge.

Engle, R. A., & Conant, F. R. (2002). Guiding Principles for Fostering Productive Disciplinary Engagement: Explaining an Emergent Argument in a Community of Learners Classroom. *Cognition and Instruction*, *20*(4), 399–483. https://doi.org/10.1207/S1532690XCI2004_1

Erickson, F., & Shultz, J. (1992). Students' experience of curriculum. In P. W. Jackson (Ed.), *Handbook of Research on Curriculum*. New York: Macmillan.

Every Student Succeeds Act, Pub. L. No. 114-95 (2016).

Fang, Z. (1996). A review of research on teacher beliefs and practices. *Educational Research*, *38*(1), 47-65.

Felton, M. D., & Koestler, C. (2015). "Math is all around us and… We can use it to help us": teacher agency in mathematics education through critical reflection. *The New Educator*, *11*(4), 260-276.

Fiedler, C. R., Chiang, B., Van Haren, B., Jorgensen, J., Halberg, S., & Boreson, L. (2008). Culturally responsive practices in schools: A checklist to address disproportionality in special education. *Teaching Exceptional Children*, *40*(5), 52-59.

Flick, L. (1995). Complex instruction in complex classrooms: A synthesis of research on inquiry teaching methods and explicit teaching strategies. Paper presented at the meeting of the *National Association for Research in Science Teaching*, San Francisco, CA.

Frank, J. (2013). Raising Cultural Awareness in the English Language Classroom. In *English teaching forum* (Vol. 51, No. 4, p. 2). US Department of State. Bureau of Educational and Cultural Affairs, Office of English Language Programs, SA-5, 2200 C Street NW 4th Floor, Washington, DC 20037.

Freeman, B., & Crawford, L. (2008). Creating a middle school mathematics curriculum for English-language learners. *Remedial and Special Education*, *29*(1), 9-19.

Frey, A. (2001). Implementing a standards-based curriculum: You're not done yet. Retrieved October 28, 2005, from http://alliance.brown.edu/investigations/spotlight/archive/apr01.html

García, O., & Wei, L. (2014). Language, bilingualism and education. In *Translanguaging: Language, bilingualism and education* (pp. 46-62). Palgrave Pivot, London.

García, O., & Kleifgen, J. A. (2010). *Educating emergent bilinguals: Policies, programs, and practices for English language learners*. Teachers College Press.

Gatbonton, E. (1999). Investigating experienced ESL teachers' pedagogical knowledge. *The Modern Language Journal, 83* (1), 35−50.

Gay, G. (2000). *Culturally responsive teaching: Theory, research and practice.* New York, NY: Teachers College Press.

Gay, G. (2002). Preparing for culturally responsive teaching. *Journal of Teacher Education*, *53*(2), 106-116.

Gay, G. (2010). *Culturally responsive teaching: Theory, research, and practice* (2nd ed.). New York, NY: Teachers College Press.

Gay, G. (2018). *Culturally Responsive Teaching: Theory, Research, and Practice*. New York: Teachers College Press.

Gay, L. R., Mills, G. E., & Airasian, P. (2009). Educational research: Competencies for analysis and applications. Columbus, OH: Merrill.

Glatthorn, A. A., Boschee, F., & Whitehead, B. M. (2009). *Curriculum leadership: strategies for development and implementation.* 2nd ed. Los Angeles: Sage.

Glesne, C. (2011). Becoming qualitative researchers: An introduction Boston. *MA: Pearson*.

Goddard, R. D., Hoy, W. K., & Hoy, A. W. (2000). Collective teacher efficacy: Its meaning, measure, and impact on student achievement. American Educational Research Journal, 37(2), 479-507.

Goldin, G. A., Epstein, Y. M., Schorr, R. Y., & Warner, L. B. (2011). Beliefs and engagement structures: Behind the affective dimension of mathematical learning. *ZDM, 43*, 547–556.

Grant, R & Asimeng-Boahene, L (2006). Culturally responsive pedagogy in citizenship education: Using African proverbs as tools for teaching in urban schools. *Multicultural Perspectives, 8*(4), 17-24.

Green, H. J., & Hood, M. (2013). Significance of epistemological beliefs for teaching and learning psychology: A review. *Psychology Learning & Teaching*, *12*(2), 168-178.

Greene, J. C. 2007. *Mixed Methods in Social Inquiry*. San Francisco: Jossey-Bass.

Greeno, J. G., & Benke, G. Engle. RA, Lachapelle, C. and Wiebe, M. (1998),'Considering conceptual growth as change in discourse practices. In *Proceedings of the Twentieth Annual Conference of the Cognitive Science Society* (pp. 1-4).

Guerra, P. L., & Wubbena, Z. C. (2017). Teacher Beliefs and Classroom Practices Cognitive Dissonance in High Stakes Test-Influenced Environments. *Issues in Teacher Education*, *26*(1), 35-51.

Gutirrez, R. (2009). Embracing the inherent tensions in teaching mathematics from an equity stance. *Democracy & Education, 18(*3), 9-16.

Gutirrez, R. (2013). Why (Urban) Mathematics Teachers Need Political Knowledge. *Journal of Urban Mathematics Education, 6*(2), 7–19.

Hammond, Z. & Jackson, Y. (2015). *Culturally Responsive Teaching and the Brain: Promoting authentic engagement and rigor among culturally and linguistically diverse students.* Singapore: Corwin.

Hammond, Z. (2015). Culturally responsive teaching and the brain: Promoting authentic engagement and rigor among culturally and linguistically diverse students. Thousand Oaks, CA: Corwin.

Hansen-Thomas, H. (2008). Sheltered instruction: Best practices for ELLs in the mainstream. *Kappa Delta Pi Record*, *44*(4), 165-169.

Harper, S. R., & Quaye, S. J. (2007). Student organizations as venues for Black identity expression and development among African American male student leaders. *Journal of College Student Development*, *48*(2), 127-144.

Harwell, M., D'Amico, L., Stein, M. K., & Gatti, G. (2000). Research contract #RC-96-137002 with OERI. Pittsburgh, PA: Learning Research and Development Center, University of Pittsburgh.

Helme, S., & Clarke, D. (2001). Identifying cognitive engagement in the mathematics classroom. *Mathematics Education Research Journal*, *13*(2), 133-153.

Herrenkohl, L. R., & Guerra, M. R. (1998). Participant Structures, Scientific Discourse, and Student Engagement in Fourth Grade. *Cognition and Instruction*, *16*(4), 431–473.

Hill, H. C., Rowan, B., & Ball, D. L. (2005). Effects of teachers' mathematical knowledge for teaching on student achievement. *American Educational Research Journal*, *42*(2), 371-406.

Hofstede, G. (2001). Culture's recent consequences: Using dimension scores in theory and research. *International Journal of Cross Cultural Management*, *1*(1), 11-17.

Hofstede, G., & McCrae, R. R. (2004). Personality and culture revisited: Linking traits and dimensions of culture. *Cross-cultural Research*, *38*(1), 52-88.

Irvine, J.J (2003), Educating teachers for diversity: Seeing with a cultural eye. New York: Teachers College Press.

Johnson, R. B., Onwuegbuzie, A. J., & Turner, L. A. (2007). Toward a definition of mixed methods research. *Journal of mixed methods research*, *1*(2), 112-133.

Johnson, K. E. (1992). The relationship between teachers' beliefs and practices during literacy instruction for non-native speakers of English. *Journal of Reading Behavior*, *24*(1), 83-108.

Johnson, K. E. (1994). The emerging beliefs and instructional practices of pre-service English as a second language for teachers. *Teaching & Teacher Education*, *10*(4), 439-452.

Karabenick, S.A., & Noda, P.A.C. (2005). Professional development implications of teachers' beliefs and attitudes toward English language learners. *Bilingual Research Journal, 28(*1), 55-75.

Kazanjian, C. J. (2019). Culturally responsive secondary education: Exploring cultural differences through existential pedagogy. *Multicultural Education Review*, *11*(1), 20-36.

Kisker, E. et. al. (2012). The potential of a culturally based supplemental math curriculum to reduce the math performance gap between Alaska Native and other students. *Journal for Research in Mathematics Education 43*(1), 75–113.

Kitchen, R. (2005). *Making equity and multiculturalism explicit to transform mathematics education*. In A. Rodriguez & R. S. Kitchen (Eds.), Preparing mathematics and science teachers for diverse classrooms: Promising strategies for transformative pedagogy (pp. 33–60). Mahwah, NJ: Lawrence Erlbaum.

Klem, A.M., & Connell, J.P. (2004). Relationships matter: Linking teacher support to student engagement and achievement. *Journal of School Health, 74*(7), 262-273.

Klingner, J. K., Artiles, A. J., Kozleski, E., Harry, B., Zion, S., Tate, W., Durán, Z., and Riley, D. (2005). Addressing the disproportionate representation of culturally and linguistically diverse students in special education through culturally responsive educational systems. *Education Policy Analysis Archives, 13*, 38. Retrieved from http://epaa.asu.edu/epaa/v13n38/

Knowles, M. S. (1990). *The adult learner: A neglected species* (4th ed.). Houston: Gulf Publishing.

Kursav, M. N., Hos, R., D. Sweeder, R., & Valles, S. A. (2022). Mind the Gap: Understanding the Disconnect Between Student Services Offered and Used. *Change: The Magazine of Higher Learning*, *54*(3), 40-47.

Ladson-Billings, G. (1994). What we can learn from multicultural education research. *Educational leadership, 51*(8), 22-26.

Ladson-Billings, G. (1995). Toward a theory of culturally relevant pedagogy. *American Educational Research Journal*, *32*(3), 465-491.

Ladson-Billings, G. (2011). Asking the right questions. *Studying diversity in teacher education*, 385-398.

Ladson-Billings, G. (2014). Culturally relevant pedagogy 2.0: aka the remix. *Harvard Educational Review*, *84*(1), 74-84.

Lampert, M. (1990). When the problem is not the question and the solution is not the answer: Mathematical knowing and teaching. *American Educational Research Journal*, *27*(1), 29-63.

Landis, J. R., & Koch, G. G. (1977). An application of hierarchical kappa-type statistics in the assessment of majority agreement among multiple observers. *Biometrics*, 363-374.

Langer-Osuna, J. M., & Nasir, N. I. S. (2016). Rehumanizing the "Other" race, culture, and identity in education research. *Review of Research in Education*, *40*(1), 723-743.

Lawless, K. & Pellegrino, J. (2007). Professional development in integrating technology into teaching and learning: Knowns, unknowns, and ways to pursue better questions and answers. *Review of Educational Research*, 77(4), 575-614.

Leder, G. C., & Forgasz, H. J. (2002). Measuring Methematical Beliefs and Their Impact on the Learning of Mathematics: A New Approach. In *Beliefs: A hidden variable in mathematics education?* (pp. 95-113). Springer, Dordrecht.

Leinhardt, G., & Putnam, R. T. (1987). The skill of learning from classroom lessons. *American Educational Research Journal, 24, 551-581.*

Lemke, J. (2007). Video epistemology in-and-outside the box: Traversing attentional spaces. *Video Research in the Learning Sciences*, 39-51.

Lewis, G., Jones, B., & Baker, C. (2012). Translanguaging: Developing its conceptualization and contextualization. *Educational Research and Evaluation*, *18*(7), 655-670.

Lin, A. (2012). Multilingual and multimodal resources in genre-based pedagogical approaches to L2 English content classrooms. *English: A Changing Medium for Education*, 79-103.

Lincoln, Y., & Guba, E. (1985). Naturalistic inquiry. Beverly Hills: Sage Publications.

Magnusson, S., & Palincsar, A. (1995). The learning environment as a site of science education reform. *Theory Into Practice, 34*(1), 43-50.

Marshall, C. & Rossman, G.B. (2006). *Designing Qualitative Research*. Thousand Oaks, CA: Sage Publications.

Marshall, C., & Rossman, G. B. (2014). *Designing Qualitative Research*. Thousand Oaks, CA: Sage Publications.

Mathiyazhagan, T., & Nandan, D. (2010). Survey research method. *Media Mimansa*, *4*(1), 34-45.

Mayfield, V. (2020). *Cultural competence now: 56 exercises to help educators understand and challenge bias, racism, and privilege*. ASCD.

McAllister, G., & Irvine, J. J. (2002). The role of empathy in teaching culturally diverse students: A qualitative study of teachers' beliefs. *Journal of Teacher Education*, *53*(5), 433-443.

McSwain, A. (2001). The effects of multicultural and bilingual training on preservice students' self-reported level of competency. *Multiple Voices, 5*(1), 54-65.

Miller, K., & Zhou, X. (2007). Learning from classroom video: What makes it compelling and what makes it hard. *Video Research in the Learning Sciences*, *321*, 334.

Moschkovich, J. (2002). A situated and sociocultural perspective on bilingual mathematics learners. *Mathematical thinking and learning*, *4*(2-3), 189-212.

Moschkovich, J. (2007). Using two languages when learning mathematics. *Educational studies in Mathematics*, *64*(2), 121-144.

Moschkovich, J. N. (2010). Language(s) and learning mathematics: Resources, challenges, and issues for research. In J. N. Moschkovich (Ed.), *Language and mathematics education: Multiple perspectives and directions for research* (pp. 1–28). Charlotte, NC: Information Age.

Moschkovich, J. N. (2012). Mathematics, the Common Core, and language: Recommendations for mathematics instruction for ELLs aligned with the Common Core. *Proceedings of the Understanding Language conference*. Stanford, CA: Stanford University. Retrieved from http://ell.stanford.edu/publication/mathematics-common-core-and-language.

Moschkovich, J. (2013). Principles and guidelines for equitable mathematics teaching practice and materials for English language learners. *Journal of Urban Mathematics Education, 6(*1), 45-57.

Moschkovich, J. N. (2015). Academic literacy in mathematics for English learners. *The Journal of Mathematical Behavior, 40*, 43-62.

Muijs, D., & Reynolds, D. (2002). Teachers' beliefs and behaviors: What really matters?. *The Journal of Classroom Interaction*, 3-15

National Mathematics Advisory Panel. (2008). *Foundations for success: The final report of the National Mathematics Advisory Panel*. Washington, DC: U.S. Department of Education.

National Center for Education Statistics. (2019). *Digest of Educational Statistics*. Retrieved from: https://nces.ed.gov/programs/digest/

National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics.* Reston, VA: Author.

National Governors Association Center for Best Practices & Council of Chief State School

Officers. (2010). *Common Core State Standards for Mathematics*.

Neuliep, J. W., & McCroskey, J. C. (1997). The development of a US and generalized ethnocentrism scale. *Communication Research Reports*, *14*(4), 385-398.

Neuliep, J. W. (2015). Uncertainty and anxiety in intercultural encounters. *The International Encyclopedia of Interpersonal Communication*, 1-9.

Newmann, F. M., Wehlage, G. G., & Lamborn, S. D. (1992). The significance and sources o student engagement. In F. M. Newmann (Ed.), *Student engagement and achievement in American secondary school* (pp. 11 39). New York: Teachers College Press.

Nieto, S. 2004. *Affirming diversity: The sociopolitical context of multicultural education*, Boston, MA: Pearson Allyn & Bacon.

No Child Left Behind Act of 2001, 20 U.S.C. § 6319 (2008).

Noel, J. (2018). *Developing Multicultural Educators*, 3rd ed. Long Grove: IL, Waveland Press.

Nora, J., & Echevarría, J. (2016). *No more low expectations for English learners*. Heinemann.

Nunan, D., David, N., & Swan, M. (1992). *Research methods in language learning*. Cambridge university press.

Op't Eynde, P., De Corte, E., & Verschaffel, L. (2007). Students' emotions: A key componen of self-regulated learning? In P. Schutz & R. Pekrun (Eds.), *Emotion in Education* (pp. 185–204). Burlington, MA: Academic Press.

Ortiz-Franco, L. (2005). Latinos, income, and mathematics achievement: Beating the odds. In W. G. Secada, L.Ortiz-Franco, N. G. Hernandez, & Y. D. L. Cruz (Eds.), *Changing the faces of mathematics: Perspectives on Latinos* (pp. 13-20). Reston, VA: National Council of Teachers of Mathematics.

Parker, F., Bartell, T. G., & Novak, J. D. (2017). Developing culturally responsive mathematics teachers: Secondary teachers' evolving conceptions of knowing students. *Journal of Mathematics Teacher Education*, *20*(4), 385-407.

Penfield, J. (1987). ESL: The regular classroom teachers' perspective. TESOL Quarterly, 21(1), 21-39.

Petrina, S. (2004). The politics of curriculum and instructional design/theory/form: Critical problems, projects, units, and modules. *Interchange: A Quarterly Review of Education, 35*(1), 81-126. Retrieved from http://www.springerlink.com/content/ut34092p3u18lk12/fulltext.pdf

Phuntsog, N. (2001, April). Culturally responsive teaching: What do selected United States elementary school teachers think? *Intercultural Education, 12*(1), 51-64.

Pintrich, P. R. (1989). The dynamic interplay of student motivation and cognition in the colleg classroom. In C. Ames & M. Maehr (Eds.), *Advances in motivation and achievement: Vol. 6. Motivation enhancing environments* (pp. 117-160). Greenwich, CT: JAI Press.

Prince, M., & Felder, R. (2007). The many facets of inductive teaching and learning. *Journal of College Science Teaching*, 36(5), 14–20.

Pultorak, E. G., & Barnes, D. (2009). Reflectivity and teaching performance of novice teachers: Three years of investigation. *Action in Teacher Education*, *31*(2), 33-46.

Raykov, T., & Calvocoressi, L. (2021). Model selection and average proportion explained variance in exploratory factor analysis. *Educational and Psychological Measurement*, *81*(6), 1203-1220.

Quappe, S., & Cantatore, G. (2007). *What is cultural awareness, anyway? How do I build it?* Retrieved January 5, 2015, from http://www.culturosity.com/articles/whatisculturalawareness.htm

Raykov, T., & Marcoulides, G. A. (2012). *Basic statistics: An introduction with R*. New York, NY: Rowman & Littlefield.

Reynolds, D. (1992). Personal history-based beliefs as relevant prior knowledge in course work. *American Educational Research Journal*, *29*(2), 325-349.

Rhodes, C. M. (2017). A validation study of the Culturally Responsive Teaching Survey. *Universal Journal of Educational Research*, *5*(1), 45-53.

Rizzuto, K. (2017). Teachers' perceptions of ELL students: Do their attitudes shape their instruction? *The Teacher Educator, 52*(3), 182-202.

Rychly, L., & Graves, E. (2012). Teacher characteristics for culturally responsive pedagogy. *Multicultural Perspectives*, *14*(1), 44-49.

Samson, J. F., & Collins, B. A. (2012). Preparing All Teachers to Meet the Needs of English Language Learners: Applying Research to Policy and Practice for Teacher Effectiveness. *Center for American Progress*.

Savin-Baden, M., & Major, C. H. (2004). Foundation of problem-based learning. Maidenhead: Open University Press.

Scarcella, R. (2003). Accelerating academic English: A focus on English language learners. Oakland, CA: Regents of the University of California.

Schachner, M. K., Schwarzenthal, M., Van De Vijver, F. J., & Noack, P. (2019). How all students can belong and achieve: Effects of the cultural diversity climate amongst students of immigrant and nonimmigrant background in Germany. *Journal of Educational Psychology*, *111*(4), 703

Schleppegrell, M. J. (2007). The Linguistic Challenges of Mathematics Teaching and Learning: A Research Review. *Reading & Writing Quarterly*, *23*(2), 139–159.

Schoenfeld, A. S. (1998). Toward a theory of teaching-in-context. *Issues in Education, 4(1),* 1-95.

Schraw, G., & Olafson, L. (2015). Assessing teachers' beliefs: Challenges and solutions. In H. Fives & M. G. Gill (Eds.), *International handbook of research on teachers' beliefs* (pp. 87-105). New York, NY: Routledge.

Setati, M. (2005). Teaching mathematics in a primary, multilingual classroom. J*ournal for Research in Mathematics Education, 36*(5), 447–466.

Sfard, A. (2008). *Thinking as communicating: Human development, the growth of discourses, and mathematizing*. Cambridge University Press.

Shah, A. (2017). Ethnography? Participant observation, a potentially revolutionary praxis. *HAU: Journal of Ethnographic Theory*, *7*(1), 45-59.

Sharkey, J., & Layzer, C., (2000). Whose definition of success? Identifying factors that affect English Language Learners' access to academic success and resources. *TESOL Quarterly, 34(*2), 352-368.

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

Shulman, L. (1987). Knowledge and teaching: Foundations of the new reform. *Harvard Educational Review*, *57*(1), 1-23.

Skinner, E. A., & Belmont, M. J. (1993). Motivation in the classroom: Reciprocal effect o teacher behavior and student engagement across the school year. *Journal of Educational Psychology, 85,* 571–581.

Sleeter, C. E. (2012). Confronting the marginalization of culturally responsive pedagogy. *Urban Education, 47*, 562–584. https ://doi.org/10.1177/00420 85911 43147 2.

Smith, A. D. (2001). Perception and belief. *Philosophy and Phenomenological Research*, *62*(2), 283-309.

Sowder, J. T. (2007). The mathematical education and development of teachers. In F. K. Lester, Jr. (Ed.), *Second handbook of research on mathematics teaching and learning* (pp. 157–223). Reston, VA: National Council of Teachers of Mathematics.

Stake, R. E. (1995). The Art of Case Study Research. Thousand Oaks, CA: Sage.

Stewart, S. (2014). Transforming professional development to professional learning. *Journal of Adult Education*, 43(1), 28-33.

Stipek, D. J. (1996). Motivation and instruction. *Handbook of Educational Psychology*, *1*, 85-113.

Stipek, D. J., Givvin, K. B., Salmon, J. M., & MacGyvers, V. L. (2001). Teachers' beliefs and practices related to mathematics instruction. *Teaching and Teacher Education*, *17*(2), 213-226.

Sullivan, P., & McDonough, A. (2007). Eliciting positive student motivation for learning mathematics. Paper presented at the *Mathematics Essential Research, Essential Practice: 30th Annual Conference of the Mathematics Education Research Group of Australasia*, Hobart, Tasmania.

Tabak, I. (2006). Prospects for change at the nexus of policy and design. *Educational Researcher, 35*(2), 24-30.

Tai, K. W. (2021). Translanguaging as Inclusive Pedagogical Practices in English-Medium Instruction Science and Mathematics Classrooms for Linguistically and Culturally Diverse Students. *Research in Science Education*, 1-38.

Tan, M. (2011). Mathematics and science teachers' beliefs and practices regarding the teaching of language in content learning. *Language Teaching Research*, *15*(3), 325-342.

Tobin, K., & Fraser, B. (1991). Learning from exemplary teachers. In H. Wax- man, & H. Walberg (Eds.), *Effective teaching: Current research* (pp. 217- 236). Berkeley, CA: McCutchan Publishing Corporation.

Trotter, Y. D. (2006). Adult Learning Theories: Impacting Professional Development Programs. *Delta Kappa Gamma Bulletin*, *72*(2).

Turner, E. E., Drake, C., McDuffie, A. R., Aguirre, J., Bartell, T. G., & Foote, M. Q. (2012). Promoting equity in mathematics teacher preparation: A framework for advancing teacher learning of children's multiple mathematics knowledge bases. *Journal of Mathematics Teacher Education, 15*(1), 67-82.

U.S. Department of Education. (2016). *English Learners Tool Kit for State and Local Education Agencies (SEAs and LEAs)*. Retrieved from https://www2.ed.gov/about/offices/list/oela/english-learner-toolkit/index.html

Ukpokodu, O. N. (2011). How do I teach mathematics in a culturally responsive way?: Identifying empowering teaching practices. *Multicultural Education*, *19*(3), 47-56.

Ulichny, P., 1996. *What's in a methodology?.* In: Freeman, D., Richards, J.C., (Eds.), Teacher Learning in Language Teaching. Cambridge University Press, Cambridge, pp. 178-196.

Van Der Wildt, A., P. Van Avermaet, and M. Van Houtte. 2015. "Do Birds Singing the Same Song Flock Together? A Mixed- method Study on Language as a Tool for Changing Social Homophily in Primary Schools in Flanders (Belgium)." *International Journal of Intercultural Relations 49*: 168–182.

Varlas, L. (2018). ELLs Count on Language Support in Math. *ASCD Education Update,* 60(4).

Walshaw, M., & Anthony, G. (2008). Creating productive learning communities in the mathematics classroom: An international literature review. *Pedagogies : An International Journal, 3(3)*, 133–149. DOI: 10.1080/ 15544800802026595

Williams, C. (2002). *A language gained: A study of language immersion at 11–16 years of age*. Bangor, UK: School of Education. Retrieved from http://www.bangor.ac.uk/addysg/publications/Ennill_Iaith.pdf

Wright, W. E., Boun, S., & Garcia, O. (Eds.). (2015). *The Handbook of Bilingual and Multilingual Education.* Malden, MA: John Wiley & Sons.

Yackel, E., Cobb, P., & Wood, T., Wheatley, G., & Merkel, G. (1990). The importance of social interaction in children's construction of mathematical knowledge. In T. Cooney & C. Hirsch (Eds.), Teaching and learning mathematics in the 1990s (pp. 12-21). Reston, VA: National Council of Teachers of Mathematics.

Zambo, R., & Zambo, D. (2008). The impact of professional development in mathematics on teachers' individual and collective efficacy: The stigma of underperforming. *Teacher Education Quarterly*, *35*(1), 159-168.

Zaslavsky, C. (1994). *Fear of math: How to get over it and get on with your life*. New Brunswick, NJ: Rutgers University Press.

Zimmerman, B. J. (1990). Self-regulated learning and academic achievement: A overview. Educational Psychologist, 25(1), 3-17.