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The Pedagogical Impacts of the Common Core State Standards on Elementary Mathematics Teachers of the Deaf and Hard-of-Hearing

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by

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B. S., Mathematics Education, Utah State University, 2009
M. Ed., Deaf Education, Utah State University, 2011

DISSERTATION

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Dedication

This dissertation is dedicated to the Deaf Community. Thank you for allowing me to be a part of your community, to use your language, to teach your children, and to have found wonderful purpose within your schools. I hope this dissertation furthers the work of educating the future leaders of your community.

Acknowledgements

My first thanks must be to God for the gifts and blessings that have allowed me to complete this dissertation. I also need to thank my beautiful wife, Mackenzie; your belief in me has encouraged me to complete this mountainous task. I also need to thank my family, especially my parents, my mother Julie and my late father Lamond, who have been supportive of my education from my first day of preschool.

I would be remiss if I didn't thank my wonderful dissertation committee. Allison Borden has been a chair who has driven me to greater levels of excellence, better depth of thought, and a dissertation I feel I can be proud to have done. Arlie Woodrum is a consummate teacher in both what he says and the things he does. Sheri Williams has brought a great depth of knowledge and tough questions that prompted me to greater quality of thought. Finally, Freeman King has been an example of a passionate teacher to me for years and made sure that Deaf Education was correctly understood throughout my journey.

As part of my journey at UNM, I need to thank all the professors who taught me about leadership, social justice, and education. I also need to thank the three cohorts I spent so much time with and learned so much from during our coursework together and beyond.

I have to thank the New Mexico School for the Deaf where I started my journey in the field of Deaf Education. I grew so much during my time there and met so many wonderful people who have influenced my life and career for the better. I also need to thank the Jean Massieu School of the Deaf, part of the Utah Schools for the Deaf and Blind, which took a chance on me to become an administrator and be part of setting a strong vision for the future.

Lastly, I want to thank my students past, present, and future who are the reason that I have continued this amazing and difficult journey. You are the future of both the Deaf Community and the world and the future is as bright as you want it to be.

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Abstract

This study explored the intersection of the Common Core State Standards and the field of Deaf Education, specifically the impact of the Common Core on the pedagogy of elementary mathematics teachers of the deaf and hard-of-hearing. I defined pedagogy in this study as the union of the philosophy of teaching a teacher holds and the methodology of teaching a teacher uses in their classroom.

This study made use of an explanatory sequential mixed methods research design, which included a phase of quantitative data collection through a survey of elementary mathematics teachers in Deaf Schools in Common Core states and a phase of qualitative data collection through interviews with a sub-sample of participants from the quantitative phase. This study was exploratory in nature and caution should be taken when attempting to generalize the findings of this study to the larger population of Deaf Education teachers. For the quantitative phase, I used an instrument I created for this study, the Deaf Education Common Core Mathematics Pedagogy questionnaire, which explored demographics, beliefs about teaching, and methods used in teaching by elementary mathematics teachers who teach in Deaf Schools in Common Core states. The instrument was disseminated using an online platform and was analyzed for reliability

post-survey. Sixty teachers participated in the survey and their data were analyzed using descriptive statistics.

The qualitative phase included comments made during the survey and interviews I conducted with eight volunteers who had participated in the quantitative portion of the study. I analyzed these data using qualitative analysis coding following a phenomenological lens.

The Common Core is having an impact on teachers of the deaf and hard-of-hearing, although the impact is a mixture of positive and negative. When the quantitative and qualitative data were integrated, six key themes emerged. From these themes, recommendations are made for Deaf Schools, teacher preparation programs, and the field of Deaf Education as a whole, mainly revolving around the need for Deaf educators to acknowledge the impact of the Common Core on teachers and students and then discuss approaches, both philosophical and methodological, for supporting teachers and students in the Common Core.

Table of Contents

List of Figures

List of Tables

Chapter I: Introduction

In today's educational world, reform and change are considered as much a part of the landscape as are consistency and tradition. It seems that each decade, since the inception of public education in America, has seen at least one major reform effort and upheaval (Tyack & Cuban, 1995, p. 1). The structure of schooling, however, appears to be largely unchanged: a teacher in a classroom with students and an executive leader supervising the teachers who reports to a publicly selected board. This is not to suggest that reforms have been ineffective, although many have been, but, rather, that the core of education is the classroom teacher, who is the bedrock of education. Through all these reforms, changes, and restructurings that come and go, one must remember that teachers are not cogs in a machine or photocopies of a workbook; teachers are human beings that must reconcile their own beliefs with institutional and societal beliefs (and changes), along with their own teaching practices and the practices expected of them by their institution and society.

For our current decade, the major reform effort has been the Common Core State Standards initiative (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010c, 2010d), more commonly abbreviated as "the Common Core", which was published in 2010 and formally adopted by 46 states and the District of Columbia shortly thereafter. The Common Core State Standards are a set of English language arts and mathematics standards that have replaced the broad continuum of existing standards with a single "common" set of standards for those states and districts that have chosen to formally adopt the standards. In describing itself, the Common Core says that it is:

> the culmination of an extended, broad-based effort to fulfill the charge issued by the states to create the next generation of K–12 standards in order to help ensure that all

> students are college and career ready in literacy no later than the end of high school. The present work, led by the Council of Chief State School Officers (CCSSO) and the National Governors Association (NGA), builds on the foundation laid by states in their decades-long work on crafting high-quality education standards. The Standards also draw on the most important international models as well as research and input from numerous sources, including state departments of education, scholars, assessment developers, professional organizations, educators from kindergarten through college, and parents, students, and other members of the public. In their design and content, refined through successive drafts and numerous rounds of feedback, the Standards represent a synthesis of the best elements of standards-related work to date and an important advance over that previous work. (2010c, p. 3)

Other documents published by the initiative speak of the "key shifts" that these standards are promoting regular learning using "complex texts" where students use "grounded evidence" to support their ideas, especially through the use of nonfiction text (2010h) and advocate for "focus, coherence, and rigor" in teaching mathematics (2010i). These themes of "college and career readiness," international competitiveness, rigor and complexity, and best practices are replete in the standards and in the literature in support of the standards. Those against the Common Core also speak of these issues, couched in a discussion of what is best for students beside a national, singular set of standards.

The Common Core is more than just a set of standards. The Common Core is an *initiative* that aims to transform the teaching in American schools (Brooks & Dietz, 2013; Henderson, Peterson, & West, 2015; National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010h, 2010i; Stern & Wood, 2014), although the

Common Core makes it repeatedly clear that it is not telling teachers *how* or *what* to teach specifically in the quest to transform the quality and "rigor" of education in America (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010c, 2010d, 2010e, 2010h, 2010i). This dual nature of the Common Core, being both a set of standards and a pedagogical initiative, has caused, and most likely will continue to cause, a great deal of contention in the educational world.

The Common Core is not standing on its own; it is based in several decades of reform efforts, lagging American educational standing in the world, and philosophical debates about the nature and purpose of education. One of the most well-known calls to reform is the *A Nation at Risk* report (National Commission on Excellence in Education, 1983), which started its report with the simple but shocking statement, "Our nation is at risk" (p. 5). The risk the commission identified was a lagging behind of America in global competitiveness and the cause of the lag was, mostly, the fault of the American education system. They urged a call to excellence for individual learners, schools and colleges, and society in education (p. 20). Several of the key reforms recommended in this report have obvious implications for the chain of events, philosophically and chronologically speaking, that led to the creation and adoption of the Common Core. Their first recommendation, labeled as A, suggested that the content of the high school required courses for graduation must be improved and included English and mathematics as the first two courses to be improved. Their second recommendation, B, suggested adoption of new standards that are "more rigorous and measurable" and give "higher expectations" for student learning (p. 35). Their fourth recommendation, D, suggested that the quality of teaching and support for teachers should be increased. Although this report does not necessarily call for a

national set of standards, it is clear to see that something akin to the Common Core has been in the works since the early 1980s.

Not only have there been calls to reform, but there have been legal requirements to reform. One of the most notable was the No Child Left Behind Act [NCLB] (2001). Education has always been the purview of the states, as delineated by the Constitution, but laws over time have increasingly put federal pressures on states to improve the quality of education within their borders. To date, NCLB was one of the stronger tools implemented by the federal government. Schools, districts, and states were required to keep a high degree of educational attainment, called Adequate Yearly Progress, as shown by valid, standardized tests. This put pressures on the education system to reform and improve, as defined by the law. Schools, districts, and states that failed to perform lost valuable, and often essential, federal funding. This law was highly controversial as its implications and requirements were felt year after year and calls to reform from many sides of the educational world sought to improve the quality of education for children in America either due to or in spite of the repercussions of NCLB. It is important to note that NCLB was officially replaced by the Every Student Succeeds Act (ESSA) in 2015, but its influence and placement in the educational timeline will continue to have positive and negative impact for years to come.

In thinking about laws, it is vital to discuss another law that holds heavy sway in the educational world, the Individuals with Disabilities Education Act [IDEA] (2004). This law provides for the education of children with special needs. However, unlike historic precedent where these students where either barred from school or forced into special schools, IDEA allows for students to be educated near their home and in classes with their “normal” peers, as far as possible. Two major concepts in IDEA facilitate this: free and appropriate public education

and least restrictive environment. Put simply, free and appropriate public education (sometimes written as FAPE in the literature) guarantees that, in public schooling, all students will receive an education that is free in cost and appropriate to their educational needs. Least restrictive environment (LRE) guarantees that the choice of school for students with special needs provides an educational and social environment that creates the least restrictions to the student. Although these concepts are simple and equitable, the interpretation of the meaning of the words for each individual student and by the vast conglomeration of educational interest groups makes this a very contested area within education. The Common Core State Standards initiative, however, and many special education groups see that the *un*-common nature of special needs students should not deny them common educational achievement as available in the Common Core. In the "Application to Students with Disabilities" document published concurrently with the standards, the Common Core states, "These common standards provide a historic opportunity to improve access to rigorous academic content standards for students with disabilities" (2010b, p. 1). However, not everyone, including special education teachers, are as optimistic about a "one size fits all" mentality to learning (Stern & Wood, 2014).

In discussing how the Common Core is being applied to special needs students, I arrive at the core of this study. A unique and dear to my heart subset of special education are the deaf and hard-of-hearing (D/HH). As is obvious, the special need of this group is the inability to partially or fully access spoken language through hearing. This presents an extremely uncommon challenge to educating a child. The whole of American society and education is focused on the ability to learn how to listen, speak, read, and write in English. The inability to speak English is a sore point for many people and "learn English" is a common rallying cry against immigrants. In schools, reading is most often taught using a phonics based approach that wholly relies on the

assumption that a child can access their and others' speech to decode the printed word. Even with assistive technologies, such as hearing aids or cochlear implants, these are often ineffective due to a variety of technological and classroom circumstances (Berg, Blair, & Benson, 1996). For those students who use sign language as their primary mode of communication, problems become even further exacerbated. In addition to language issues, the placement of D/HH students into schools is not a black-and-white process: there are regular classroom settings, special D/HH only classes within a regular school, a special magnet program for D/HH students in an area, and special schools (often state run) for D/HH students only (called Deaf schools). In spite of these uncommon challenges, D/HH students are expected to achieve all that the Common Core requires with the only mention of accommodations for D/HH students being that "*speaking* and *listening* should be broadly interpreted to include sign language" (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010c, p. 6).

In the course of my duties as an educator at a Deaf school, I spent time with elementary mathematics teachers supporting them in their instruction and in the transition to the Common Core State Standards for Mathematics (2010d). Feelings about the Common Core were and are mixed, even when talking about the feelings of a single teacher rather than the group. These mixed feelings intrigued me and as I talked to more teachers and observed classes more often, I saw a confusing range of teaching practices all undertaken in the name of the "Common Core" and what teachers perceived was now expected of them as both teachers of the D/HH and teachers using the Common Core.

This leads to the problems that I proposed to investigate through this study. The Common Core State Standards (2010c, 2010d) are now the accepted standards for the vast majority of

Deaf schools, programs, and students across the United States. Deaf education, however, is a very *un*-common sub-field of education that deals with a very *un*-common group of students. The union of a common set of standards and the associated initiative's ways of thinking about education with the historical context, battles, and philosophies of Deaf education is having an impact on the teachers of the deaf and hard-of-hearing. Navigating these impacts is, most likely, having an influence on the pedagogy of these teachers and has the potential to be creating a feeling of dissonance within their pedagogy. These phenomena need to be explored.

Research Question

As discussed in the previous section, the combination of the Common Core and Deaf education is, most likely, having an impact on teachers of the deaf and hard-of-hearing and their pedagogy. For reasons discussed further in the delimitations section, I focused on elementary mathematics. The question driving this study was: What are the pedagogical impacts of the Common Core State Standards on elementary mathematics teachers of the deaf and hard-of-hearing?

Researcher Positionality

Understanding a researcher's position is important in understanding not only the impetus for researching a given topic but, also, understanding how the research has been conducted and analyzed (Creswell, 2013, pp. 54-55). I have wanted to be an educator since the 3rd grade when my teacher had each student in the class teach one chapter out of the book we were reading. I was hooked from that point and, when I entered college, I enrolled in the mathematics education program at Utah State University. During that time, my peers and I heard many rumors of possible national standards for mathematics that would simplify and improve the existing diverse

standards each state has. To an undergraduate student facing the beginnings of a career, this seemed like a common-sense step for my new profession.

Around that time, a friend of mine convinced me to take an American Sign Language (ASL) course. I always had a mild interest in sign language, so I went ahead and took an introductory course. After only two class sessions, I felt that I had found my new career path: Deaf Education. I connected with Utah State's Deaf Education program and, after receiving my degree in mathematics education, enrolled in their master's degree. This program did not just focus on the methodology of using sign language to teach, however, and my education also contained a philosophical component about the value of language and the importance of the Deaf community and culture in the education of D/HH children.

For the most part of this last decade, specifically at the beginning of my doctoral studies and dissertation process, I had worked at the New Mexico School for the Deaf (NMSD) located in Santa Fe, New Mexico. This school has a bilingual philosophy utilizing ASL and English, although most students only access English in its written form rather than spoken form. ASL is the language of instruction with English serving as the written language of instruction at the school, and students who have the aptitude and desire also receive spoken English services. The linguistic and cultural perspectives of the school were in line with both my personal philosophy and what I learned at Utah State University. For the majority of my time at NMSD, I was a middle and high school mathematics teacher. One of my main projects was the transition of the mathematics curriculum to the Common Core State Standards for Mathematics (2010d).

As a high school teacher, the major shifts of the Common Core have been to increased rigor in teaching a more internationally aligned mathematics curriculum, but my personal teaching style, choice of curriculum, and goals for students have not essentially changed. Other

secondary mathematics teachers I have worked with have had mixed feelings and approaches to the Common Core. In my discussions with elementary teachers, however, I have noticed a dramatic range of feelings towards the Common Core and approaches to teaching that vary from teacher to teacher. For several years, my curiosity has been piqued by these mixed reactions to the Common Core – both the standards and the initiative's ways of thinking. In the Educational Leadership program at the University of New Mexico, where I completed my doctoral studies, I had the opportunity to begin to explore this issue and feel that it is a vital mirror to hold up to the Deaf education field.

During the implementation and writing of this dissertation study, I changed positions within the field and became the Assistant Director of the Jean Massieu School of the Deaf in Salt Lake City, Utah. In meeting my new staff, I again began to see the conflicting opinions about the Common Core. Even in a different state, different school, different demographic region, and different leadership, the issues surrounding the Common Core have again showed themselves as a nationwide phenomenon that begs to be investigated.

Known biases that I bring to this study are:

- A belief that ASL and Deaf culture are vital to the academic and social success of D/HH children;
- A belief that Deaf schools are the preferable choice for most D/HH students;
- A belief that all D/HH students can succeed at high levels, fulfilling the statement by Deaf leader I. King Jordan, "deaf people can do anything hearing people can do, except hear" (Gallaudet University, 2016, p. 1);
- A belief that the Common Core State Standards (2010c, 2010d) are a good step in American educational progress; and

- A belief that the Common Core is having an impact on teachers of the deaf and hard-of-hearing.

There are many subtle and impactful biases that each researcher brings to their research. My gender, age, hearing status, experiences with professional development and training, pedagogy used during my own teaching tenure, leadership styles, administrative expectations, and other factors had an influence on how I saw and analyzed this work. I tried to keep in mind Creswell's (1998, 2014) research best practice of attempting, to the extent possible, to bracket my personal biases so that they did not unduly effect the design, research, or data analysis of this study.

Conceptual Framework

Pedagogy. I sought to understand how the pedagogy of elementary mathematics teachers of the deaf and hard-of-hearing has been impacted by the Common Core. Pedagogy is a fascinating term that is at once both completely understood and highly unshared or unaligned in meaning. Everyone has their own personal definition and/or institutional definition, but there is no single, common definition. In reviewing the definitions of pedagogy common in English speaking countries, Cogill (2008) found that most definitions focus on "the act of teaching together with its attendant discourse" (p. 1). The word pedagogy is a Western world adaptation of the Greek word "pedagogue," meaning someone who guides a child and specifically referred to the private tutors hired by Grecian aristocrats (Mortimore, 1999). Again, this definition refers to the actions a teacher takes in guiding a child in learning.

However, looking at the use of the term, especially in non-English European contexts, it also includes, or at least connotes, a philosophical portion beyond just the action. Teachers refer to a sense of "style" or "craft" in how they talk about the "art and science" of teaching (Ax &

Ponte, 2008; Cogill, 2008; Marzano, 2017; Mortimore, 1999). This suggests that teaching is more than just a set of tasks for a person to complete, but a complex interplay between the minds and actions within a classroom. Mortimore (1999) suggests that the practitioner definition of pedagogy has six elements: goals, social structure, role, time and pacing, resources, and tasks (p. 5). This is much more in line with the Dutch *pedagogiek* than the English *pedagogy*. *Pedagogiek* is best described as a science that "seeks answers to questions about what kind of human beings children should become and how they can be raised toward becoming such human beings, taking into account the social and political context in which this process of upbringing takes place" (Ax & Ponte, 2008, p. 2) and takes into account that a child has two influences: the drive of the "environment," which includes parents and teachers and "the drive coming from the child" to become "someone" (p. 6). Pedagogy in this sense, then, is an intersection of actions, beliefs, and socialization and involves both the content of teaching and the actions of teaching. This follows Cogill's (2008, pp. 1-2) description of the seven categories of knowledge that a teacher must have:

1. Content knowledge
2. General pedagogical knowledge
3. Pedagogical content knowledge
4. Curriculum knowledge
5. Knowledge of learners and their characteristics
6. Knowledge of educational contexts
7. Knowledge of educational ends, purposes, and values.

Although the use of the term "pedagogical" in this context refers to actions, the concept remains that pedagogy begins as a mental component of teaching, rather than purely

methodological. Mortimore (1999) synthesizes several decades of research on learning to define five broad categories of learning:

1. Getting more knowledge
2. Memorizing and reproducing
3. Acquiring and applying procedures
4. Making sense or meaning
5. Personal change

These categories are reminiscent of Bloom's Taxonomy (Bloom, 1956), a favorite theory of education. It can be noted that the learning complexity progresses as one moves from the lower to higher levels of learning categories and/or Bloom's Taxonomy. Methodology alone cannot create these levels of learning but requires active thinking and adaptation. Thus, rather than pedagogy being a methodological construct only, I will define pedagogy as the philosophy and methodology of teaching.

Using "philosophy" in the singular may suggest that only a teacher's beliefs, attitudes, values, and experiences play a role in the pedagogy a teacher has in their classroom. Mortimore (1999), however, describes a three-pronged relationship, displayed in Figure 1, that creates the philosophy of a teacher. The teacher, called practitioner by Mortimore (1999), brings their own personal experience and deals with a highly complex situation, teaching in a live classroom, that requires immediate action. I would venture to define practitioners within a larger context to include paraprofessionals, related servers, and administrators. Next is the researcher who brings to the classroom "research based best practices" for teachers to apply and contemplate. The policy maker finishes the relationship by bringing in regulation, law, and political pressure to education. The interplay of these three entities creates the philosophical environment that a

teacher navigates and applies to their classroom teaching. However, it is important to note that there does not need to be agreement among these three entities and potential dissonance can exist.

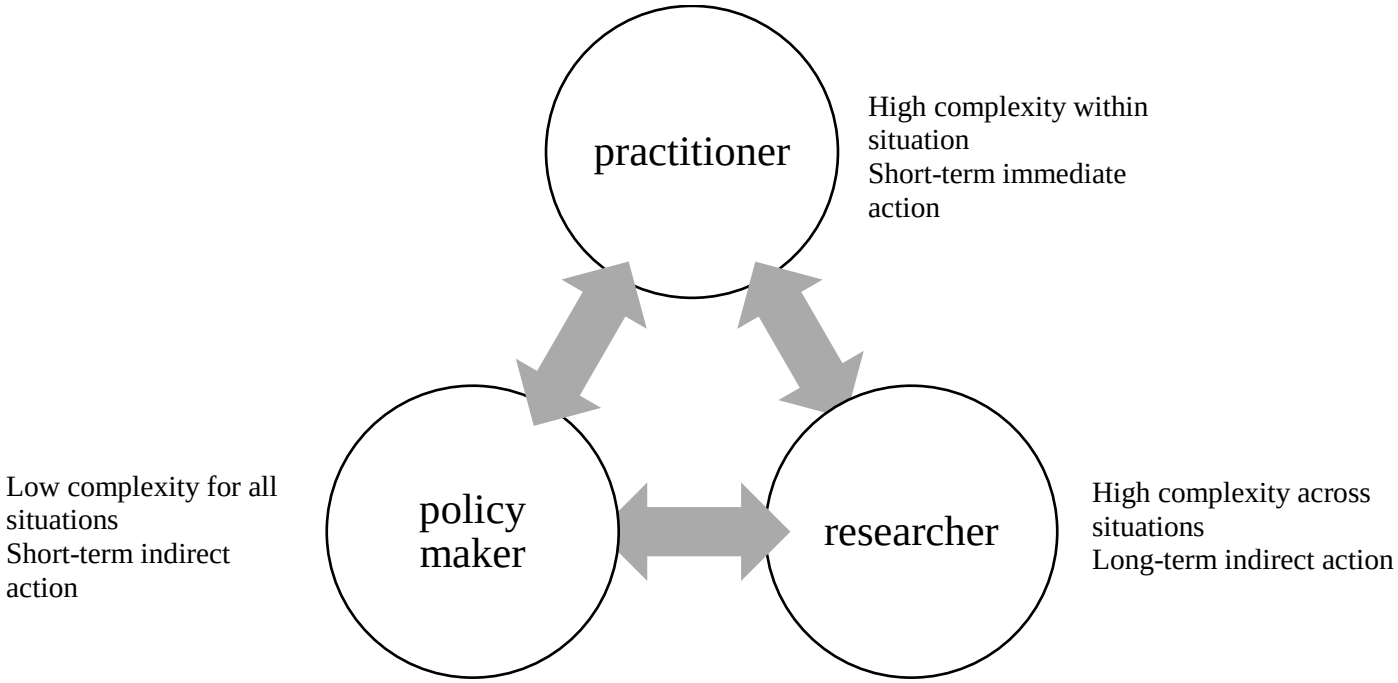

Figure 1. Practitioner, researcher, and policy-maker relationships in pedagogy (Mortimore, 1999).

From this model, it is easy to see how the Common Core can have a heavy influence on the policy maker and researcher entities and, through those entities, pressure is put onto the practitioner to succeed in the Common Core, although there are now mixed reactions in policy and research circles regarding the Common Core. Deaf education also sees an interplay among these three entities and has a highly divisive reaction to much of the interplay among these three. This reactive interplay can be seen in the call to 21st Century pedagogy by Hermann-Shores (2017) in stating that appropriate pedagogy for sign language users,

> Should be the implementation of bilingualism and biculturalism (or even multilingualism with multiculturalism), following Grosjean's call for the right of the deaf person to grow

> up bilingual (Grosjean, 1996). The modern learner, viewed as a bicycle rider, ought to be given the environment where he or she can ride the bicycle for a lifetime of learning and practice within language communities. Once the rider attains all the necessary and authentic competences, he or she will be equipped to proceed with sustained support provided by the legal underpinnings of the CRPD [Convention on the Rights of Persons with Disabilities (United Nations Division for Social Policy and Development, n.d.)] (p. 364).

Methodology, which I posit stems from the philosophy of teaching, depends greatly on what the goal of pedagogy is for a teacher. Marzano (2017) states that the methodology of teaching accomplishes three tasks: feedback, students understand what they are to master and their own progression of that mastery (pp. 11, 21); content, involving "strategies teachers use specifically to help student learn the information and skills that are the focus of instruction" (p. 29); and context, referring to "students' mental readiness during the teaching-learning process" (p. 65). All these methodological aims are mediated through student mental states and part of methodology is preparing students to be in a mental state to learn the given curricula (pp. 5-7). Figure 2 demonstrates Marzano's "teaching and learning progression," demonstrating the use of methodology that is generated by informed philosophy.

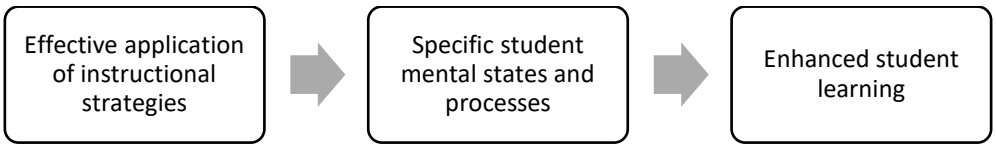

Figure 2. The teaching and learning progression (Marzano, 2017, p. 5).

Theories of pedagogy and curriculum suggest three types of pedagogies: pedagogy as product, pedagogy as practice, and pedagogy as praxis (Ax & Ponte, 2008; Cogill, 2008; Ford & Profetto-McGrath, 1994; Grundy, 1987, 1993; A. V. Kelly, 2004; Korthagen & Kessels, 2016; Mortimore, 1999).

Pedagogy as Product. When pedagogy focuses on the product of learning (A. V. Kelly, 2004, pp. 46-73), it emphasizes a "technical interest" that focuses on achieving pre-defined goals from learners engaging in the environment in a prescriptive manner. This kind of pedagogy "foster[s] action rather than interaction; the action is between a subject and an object that is acted upon" (Ford & Profetto-McGrath, 1994, p. 341). The main types of learning emphasized in product are "getting more knowledge" and "memorizing and reproducing." However, it must be noted that "acquiring and applying procedures" in the context of real world problems is used by teachers who focus on an "end product" rather than only the "transmission of information" (Glatthorn, Boschee, & Whitehead, 2009, pp. 91-93).

Pedagogy as Practice. When a pedagogy focuses on practice or "process" (A. V. Kelly, 2004, pp. 76-99) it emphasizes a "practical interest" that seeks "consensual understanding and meaning-making" and fosters interactions between subjects (Ford & Profetto-McGrath, 1994, pp. 341-342). This pedagogy often uses a reflective process in applying knowledge to methods to facilitate the joint process of knowledge between the teacher and learner. Due to this kind of pedagogy, "the focus is on what is actually taking place in the classroom as well as the learning

process itself" (Glatthorn et al., 2009, p. 93) and takes learning beyond the two lower forms of learning ("getting more knowledge" and "memorizing and reproducing"), which are seen in Pedagogy as Product, by including the next two higher forms of learning: "acquiring and applying procedures" and "making sense or meaning."

Pedagogy as Praxis. This type of pedagogy has firm roots in the philosophy of Paolo Freire (2000), that learning must not only impart knowledge and the ability to solve problems, but learning must give the learner an awareness of the realities of life and the ability to challenge inequalities, which is in line with the European *pedagogie* definition of pedagogy. Pedagogy as praxis emphasizes "emancipatory interest" and arises from "authentic, critical insights" of how society is currently established (Ford & Profetto-McGrath, 1994, p. 342). Unlike the other two pedagogies, praxis pedagogy seeks to eliminate externally imposed parameters on learning and product (Grundy, 1993; Korthagen & Kessels, 2016). This type of pedagogy "deals primarily with practical deliberation and differentiated curriculum" (Glatthorn et al., 2009, p. 94). Pedagogy as practice uses reflective thinking to improve action, but maintains a single direction focus of knowledge to action. Pedagogy as praxis, on the other hand, uses a dual-direction reflection where the act of teaching with diverse learners creates new knowledge that shapes further action. In Deaf Education, Hermann-Shores (2017) would define this as a "learning" curriculum that is situated in a cultural and social context where teachers facilitate *learning* rather than focus on merely teaching within the student's reality "represented by a symbolism shared by the members of sign language cultural communities" (p. 363).

Pedagogy in Dissonance. The three pedagogies I have discussed (product, practice, and praxis) all involve a relationship between the knowledge (philosophy) of the teacher and the action (methodology) the teacher employs in teaching. The literature does not discuss the very real

possibility that a teacher may feel a disconnect between their philosophy and methodology due to demands from external forces that are not in harmony with a teacher's desired pedagogy. The three pedagogies show a connection between the teacher's beliefs and actions. To use an analogy: product is a single-color painting by the teacher, practice is a two-color painting by both teacher and learner, and praxis is a multi-colored painting that evolves as the painting is being created. A dissonant pedagogy, to further the analogy, would be a paint-by-numbers painting in the hands of Picasso.

The Common Core has the potential to create all four types of pedagogy. I sought to understand what the pedagogical impact is on teachers of the deaf and hard-of-hearing to see which pedagogy currently exists within Deaf education under the Common Core. Figure 3 presents a model of how pedagogy is defined within the context of this study.

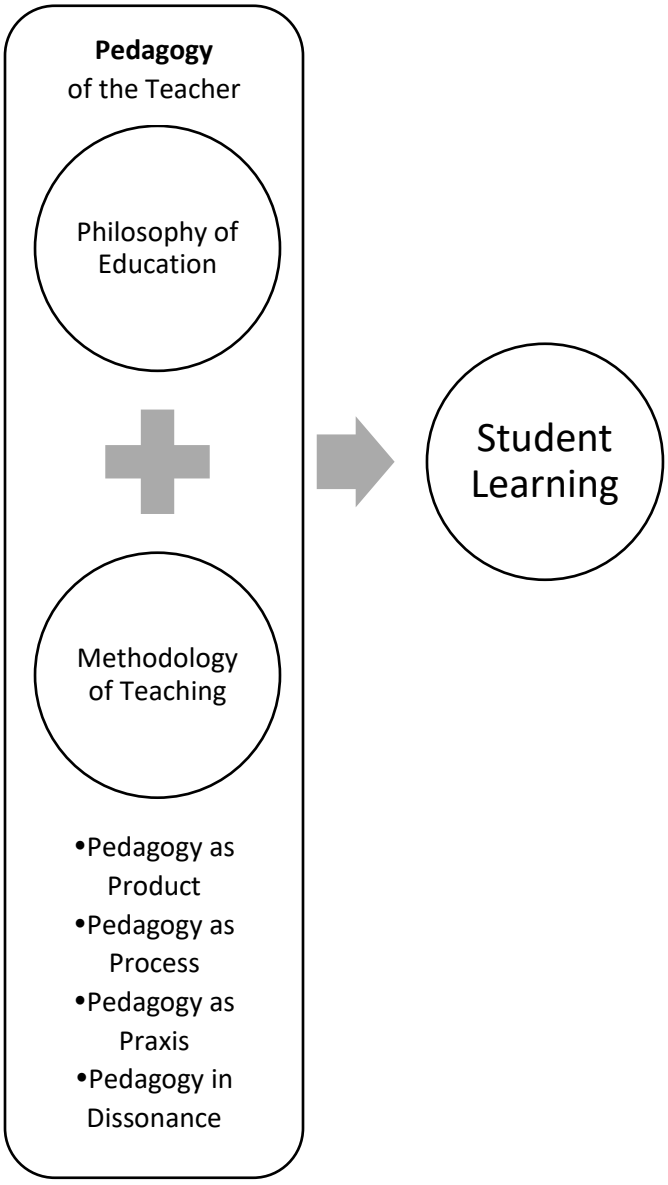

Figure 3. Conceptual model of pedagogy.

Cognitive Dissonance. This final pedagogy begs for a brief discussion about cognitive dissonance. As pedagogy has been defined as having both a cognition component (philosophy) and an action component (methodology), cognitive dissonance could come into play within Deaf education under the Common Core. Defining this theory simply, "cognitive dissonance was

based on an idea of what occurs inside people's heads. Inconsistent cognitions caused tension, the tension is arousing and experienced as an unpleasant state, and people are driven to reduce it" (Cooper, 2007, p. 42). Cognitions are a person's thoughts, beliefs, and mental experiences and when a person performs an action that is not in line with their cognitions or if a person tries to hold two contradictory cognitions at the same time, the inconsistency is unpleasant and the person is driven to lessen the inconsistency through either a behavior change (more difficult) or an attitude change (less difficult). Often, the attitude change creates a more favorable and positive view of what was previously an aversive way of thinking. Cooper (2007), a pioneer in the field of cognitive dissonance, suggests a formula to encapsulate Festinger's original theory and which holds true through the 50 years of evolution of the theory:

$$\text{DISSONANCE MAGNITUDE} = \frac{\text{SUM (discrepant cogntions } \times \text{importance)}}{\text{SUM (consonant cognitions } \times \text{importance)}}$$

In this formula, cognitions and behaviors that are not in harmony are placed in the numerator, magnifying the dissonance. Cognitions and behaviors that can serve to lessen the dissonance are placed in the numerator, decreasing the dissonance. Often, the change in attitude or behavior creates a new state that is placed in the denominator rather than the numerator.

Cognitive dissonance does not always occur, even if the actions do not have harmony with the belief of a person. The causes of cognitive dissonance are seen as inconsistent behavior but only if these conditions are met: decision freedom is high, people are committed to their behavior, the behavior has adverse consequences, and when those consequences are foreseeable (p. 73). These allow a person to still act inconsistently as the "consonant" cognitions "but only" list above, which allows allow a person to relieve themselves of dissonance *without* a personal change.

Teaching an uncommon group of students using the Common Core has the potential to create cognitive dissonance in the pedagogy of teachers of the D/HH. Teachers may have a more favorable view of the Common Core than they initially had due to the balancing effect of cognitive dissonance. However, the conditions of dissonance may not be met due to the proscribed commonality of the Common Core and, thus, teachers may have dissonant pedagogy without dissonance. At present, the potential for cognitive dissonance exists but there is no discussion as to whether or not it is actually occurring in Deaf education.

Definitions of Terms

deaf and hard-of-hearing. When these terms are used with lowercase letters, they refer to any individual with a permanent hearing loss greater than 20 decibels. In general connotation, "hard-of-hearing" means a person has access to spoken language sounds and can use speech; "deaf" means a person does not have access to spoken language sounds and usually does not use speech. These terms are often used interchangeably and the exact determination of deaf or hard-of-hearing is left up to the individual and how they identify themselves. In literature, this is often abbreviated as "D/HH."

Deaf. When this term is used with an uppercase letter, it refers to two distinct but overlapping meanings. The first is the community of deaf and hard-of-hearing individuals and all groups, services, and programs related specifically to their deafness. The second meaning is an individual or group that identifies with the cultural and linguistic identity of being deaf and using American Sign Language as their primary language, regardless of level of hearing loss.

Hearing. Any individual or group that has "normal" hearing ability and is culturally not part of the Deaf community.

Deaf Education. The set of educational philosophies, methodologies, programs, and schools that are specifically set to educate and support D/HH students.

Deaf School. A school separate from a traditional mainstream setting of hearing students, often state run, that serves only D/HH students and often has both Deaf and hearing teachers.

Deaf Program. A separate program within a hearing school or district that serves only D/HH students, although it may place the student in regular classes with supports. Often has both Deaf and hearing teachers.

Mainstream. The placement of a D/HH student within a regular education or special education setting with or without a sign language interpreter.

Common Core State Standards. The collection of English language arts and mathematics standards published by the National Governor's Association and Council of Chief State School Officers (2010c, 2010d).

The Common Core. The sets of Common Core State Standards, the philosophical and methodological aims of the Common Core State Standards Initiative, and the interpretations of the standards and initiative by the states and educational agencies that influence how schools and teachers use the standards.

Limitations

The first limitation of any study includes the personal lenses and biases of the researcher. Previously, I mentioned my known biases and personal positionality and, thus, attempted to bracket out these factors from unduly influencing the study. However, I came with notions, ideas, and perspectives that may potentially have limited how I perceive data and the types of ideas that I naturally developed. I relied on my dissertation committee to help ensure that I have adequately bracketed myself out of my study.

Another limitation of this study was focusing specifically on Deaf education. Deafness is a low incidence population, with some estimates placing the number at roughly 1% of the school population (National Center for Educational Statistics, 2016; Supporting Success for Children with Hearing Loss, 2016). There are only 548 recognized programs for the Deaf in the United States and only 123 schools identified as Deaf schools (American Annals of the Deaf, 2016a), and only 87 of those schools qualified for this study. From there, it's easy to see that the total number of students in the United States and the total number of teachers, who were the participants in this study, is small in relation to the total student population and, as the focus of this study, presented a population smaller than many studies would deem appropriate for even a sample. Studying a small and highly specific population carries with it potential difficulties. Furthermore, some participants in this study used American Sign Language (ASL) as their primary language, necessitating translation considerations and the potential for unknown mistranslation issues.

Another limitation is the "recentness" of the Common Core. The standards were only introduced in 2010 and, as of the writing of this study, only eight years have passed. In the academic world, this is a relatively short time to see full results, especially as most states had a transitionary period in the implementation process (for an example see: http://newmexicocommoncore.org/pages/view/22/transition-timeline/), meaning that many states have used the new standards fewer than seven years. Nationwide, standardized tests using the Common Core, such as the Partnership for Assessment for Readiness for College and Career (PARCC) or Smarter Balanced assessments, have only been implemented since 2015. Academic studies and writing require time to write, review, and publish, and so there may be studies on the Common Core that have not been published yet, lending limitations to the literature review.

A final limitation is the new data collection instrument I used. Although I made every effort to ensure a valid and reliable instrument, any new instrument has potential issues that may have limited the effectiveness of data collection or evaluation.

Delimitations

In this study, I looked at teachers and their pedagogical reactions to the Common Core. I did not choose to look at schools, states, or national responses to the Common Core, although this information found a small place within the review of the literature and in the teachers' own perceptions and feelings, as well as the shaping of the ideas and approaches I used in this study. Furthermore, I did not consider agencies, publishers, or curriculum groups' responses to the Common Core, although these areas are of interest and some research is being conducted at this time. For this study, however, the unit of analysis remained the teacher because teachers are the foundational unit of education and one of the only consistent factors throughout the history of educational reform.

In studying the Common Core, I excluded states that do not formally use the standards. At the time this study was designed, these states were: Alaska, Indiana, Nebraska, Oklahoma, South Carolina, Texas, and Virginia. Additionally, I only focused on mathematics classrooms. Although English language arts is an important area to study, a single study, of necessity, must focus on a smaller portion of the total picture. My personal background is in mathematics and pilot studies have yielded some interesting results in mathematics under the Common Core. Thus, I chose to focus only on mathematics. Minnesota has only adopted the English language arts standards of the Common Core and, thus, had to be excluded, as well.

There are two types of settings with three main communication philosophies that define educational programs for D/HH students: mainstream settings and special school settings;

ASL/English (bilingual approach using American Sign Language), Total Communication (the use of sign language and spoken language simultaneously), and Listening & Spoken Language (spoken English only without sign language) communication philosophies. Mainstream settings are settings 1 and 2 under IDEA (2004) and involve a student being placed in a regular public school with supports, such as interpreters or self-contained classrooms. I chose to not use this setting for this study as the teachers involved may not consider themselves "teachers of the deaf" as they often are regular teachers with a singular student D/HH in their classroom. I also chose not to include this setting due to their methods of inclusion; D/HH students in these settings who function higher academically tend to be placed in regular classroom settings, thus making them not part of the Deaf education setting, which significantly alters the make-up of the student population to not be representative of all D/HH students in this setting, making it not ideal for what I wished to study. Thus, I used special school settings, setting 3 under IDEA (2004), and which are normally called "Deaf Schools." For the sake of broader understanding in this study, I elected not to eliminate any of the communication philosophies from participating in the sample.

Finally, I only focused on elementary school, which is defined as beginning in kindergarten under the Common Core. Individual schools choose to end elementary at either 5th or 6th grade. Although my personal background is in secondary education, personal experience and pilot studies suggested that elementary teachers have felt the impact of the Common Core more intensely than secondary mathematics teachers.

Significance of the Study

This study considered an area where relatively little research has been done to date. Thus, this study is not a replication study, but a new study looking into an under-researched topic. This is not, however, the true significance of this study.

Deafness is not merely a disability. The community of deaf and hard-of-hearing persons view themselves as an ethnolinguistic cultural minority (Lane, Hoffmeister, & Bahan, 1996). Deafness is an interesting disability as it impacts a broad swath of society. Although many D/HH children come from low socioeconomic status homes, hearing loss impacts all races, classes, and groups. Deaf culture is historically transmitted from peer-to-peer in a Deaf school setting rather than the more traditional parent-to-child transmission model. These factors make Deaf schools a uniquely important setting to understand for the benefit of the Deaf community (Lane et al., 1996; Nomeland & Nomeland, 2012). Furthermore, helping teachers and schools better understand their unique position will benefit schools.

The Common Core has been an interesting educational reform. It is not a law, although there were political pressures associated with its creation and adoption. It was not locally developed, but it was accepted at a relatively local level. It was not universally accepted, but it had been accepted by the vast majority of states at the beginning of 2016. It will be interesting to see what happens to the Common Core in light of the Every Student Succeeds Act (2015), which removes the federal mandate for states to adopt the standards to receive certain types of federal funding. The Common Core has a far-reaching effect and has been highly controversial since its inception. Even if the Common Core is discarded, as it has been in a few states, its influence continues in these states and in the American education system. To date, many studies have looked at the political issues of the Common Core (Bestor, 2016; Burris, Montgomery, & Starr, 2016; Hartong, 2015; Pew Charitable Trusts, 2014), the achievement of students (Bunch, Kibler, & Pimentel, 2013; Heitin, 2016; McLaughlin, 2012; Schmidt & Burroughs, 2013), or how teachers have felt prepared for the Common Core's implementation (Burks, Beziat, Danley, Davis, Lowery, & Lucas, 2015; Sawchuk, 2012; Shanahan, 2015; Swars & Chestnutt, 2016). By

understanding how teachers are influenced by the Common Core, the field of education can better understand how the Common Core is being used and understood by teachers and, by extension, schools.

Finally, the significance of this study also comes from the unit of analysis: teachers. As has been mentioned, teachers have remained a consistent figure in education throughout centuries of reform and change. Teachers are highly influential figures in teaching and learning and their pedagogy has long-term impact on how students learn and develop. By seeking to understand teachers and their pedagogy, especially those teachers who work with D/HH students, policy makers and schools can better understand teachers' needs and, thus, better support teachers in using the Common Core to benefit students.

Chapter II: Literature Review

I sought to understand the relationships between the Common Core and Deaf Education. Specifically, I looked at how the pedagogy of teachers of the deaf and hard-of-hearing (D/HH) has been impacted by the implementation of the Common Core State Standards (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010c, 2010d) in Deaf schools across the United States. The research question that guided this study was: What are the pedagogical impacts of the Common Core State Standards on elementary mathematics teachers of the deaf and hard-of-hearing? In this chapter, I discuss what is already known about the Common Core, Deaf education, and the union of the two. For the purposes of this study, I use pedagogy, as discussed in Chapter I, with very specific conceptual meaning, the union of a teacher's philosophy and methodology. Thus, in discussing these major concepts, I will also weave in what is known about pedagogy in these areas of education.

Deaf Education

The sub-field of American education that comprises the education of deaf and hard-of-hearing students, called Deaf Education, is a very unique portion of the educational system. Educationally significant hearing loss is a low incidence disability (Karchmer & Mitchell, 2004; Spencer & Marschark, 2010) comprising only between 1-10 students out of every 1,000 (National Center for Educational Statistics, 2016). With that figure in mind, it is also interesting to note that deafness is a well-known disability that has a long history of representations and misrepresentations and references in culture. Currently, the success of Nyle DiMarco has, again, brought deafness into the mainstream discussion; DiMarco was a contestant and winner of both America's Next Top Model and Dancing with the Stars television shows. Further, recent movies, such as "A Quiet Place", have starred a newcomer Deaf actress, Millie Simmonds, sparking

interest in her life and experiences. With this notoriety has come public discussion about what it means to live with hearing loss and the role of sign language versus speech in the success of the lives of deaf and hard-of-hearing (D/HH) individuals. This debate is not just in the public realm but is the fundamental and most firmly entrenched ideological battle of Deaf Education. One can take several positions of looking at D/HH students: a purely medical perspective, a perspective that values speech and hearing, a perspective that values sign language (American Sign Language in the United States) and Deaf culture, perspectives of local mainstream versus centralized special schools, perspectives of D/HH students being part of the special education divisions of school, or perspectives of D/HH students being part of the English language learning divisions of school. Often, educators carry several of these perspectives simultaneously.

Understanding the history, the major ideological issues, and the current pedagogical expectations of the Deaf education field is essential before undertaking a discussion of how the Common Core State Standards may be having an impact upon Deaf education. In this section, I review the current literature relating these key concepts.

History of Deaf Education. Deafness is not a new concept to humanity. One can look at the histories of the world and see multiple references to individuals who are deaf (Enerstvedt, 1996). However, most of these references are in a more negative light and their deafness is seen as a debilitating condition worthy of pity, a prime example being the miracles by Jesus in the Christian Holy Bible (see Mark 7:31-37, King James Version). For the most part, it was a pity to be deaf in ancient times as the inability to hear was perceived as a major handicap (most likely caused by some sin or ill deed by parents, child, or soul) and the very idea of educating these people was seen as an inconceivable endeavor (Senghas & Monaghan, 2002).

Looking to the Greeks, long considered the bastion of learning in the ancient world, there is some of the first recorded discussion on educating D/HH persons. Socrates, the notable philosopher, led the theory that language and thought are inseparable and, in fact, language *is* thought (Busby, 2001). At that time, and sadly in our modern world, language was strictly defined by one's ability to produce clear spoken speech. This ability to speak is so fundamental to this ancient notion of language and for the vast majority of human history that those with hearing loss were called "deaf and dumb" or "deaf-mute" in direct reference to both the inability to hear *and* the inability to speak. In Socrates' view of the ability to think, the deaf did not have the language necessary to think. This view was not just held, but boldly declared by Socrates' protégé, Aristotle, who stated, "Those who are born deaf all become senseless and incapable of reason" (Enerstvedt, 1996, p. 7). The finality of his words are easily seen and educating D/HH children did not occur.

Perhaps "did not occur" is a little bit of a fallacious statement. Historical records (Berthier & Henry, 2009; Enerstvedt, 1996; Groce, 1985) suggest that there were small communities of D/HH people in cities across Europe that had their own sign languages. Thus, there may not have been formal schooling opportunities, but a *community* suggests these D/HH people had opportunities for communal learning and the intelligence to develop and use a language. One philosopher who held this belief was Rene Descartes, the famous French academic. He argued against the Aristotelian notion of the requirement of language (defined still as spoken language) as necessary for thought by citing the Deaf communities of France and their use of sign language as evidence of thought sans-language (Busby, 2001; Nomeland & Nomeland, 2012). His notions, however, were ignored and rejected. Modern thinking, though, has vindicated his ideas.

Deaf education, meaning the purposeful and government sanctioned/supported education of D/HH children, came into being in the 1760's in Paris, France. A French priest, Charles Michael de l'Epée, became interested in the plight of deaf Parisians (Fischer, 1993). Being a priest, he was extremely interested in the salvation of these souls who were previously thought to be incapable of Catholic rites due to the communication barriers that come with hearing loss. He took the existing sign language of the Deaf community of Paris and made adaptations to the language to create the language that has evolved into what is called French Sign Language (often abbreviated to LSF). His adaptations to the language were to take existing signs and lexicalize them (alter the signs to include the letter corresponding to the spoken language of the hearing majority) to create a language that incorporated both French and sign language linguistic concepts (Lane et al., 1996). His manual alphabet system is still used by a wide range of sign languages across the world, including American Sign Language. The Abbe de l'Epée was given permission and support to found a school in Paris for the education of D/HH students from both secular and religious governance organizations. His original religious mission eventually gave way to a broader mission of general schooling. To further his cause, D/HH students from all over France came to Paris to learn from this unique school. His pupils, both hearing and deaf, took their lessons back to the provinces of France to establish their own schools for the D/HH, giving rise to Deaf schools both using a sign based teaching philosophy and other language philosophies (Berthier & Henry, 2009).

However, De l'Epée was not the only person to attempt to educate the D/HH. In Germany, Heinecke began his work on a speech-based (oralist) method of Deaf education and in England, the Braidwood family established their own school (Nomeland & Nomeland, 2012), although their proprietary beliefs about their method means that modern scholarship can only

guess as to what they did, although the general belief is that it was a combination of signed English and oral methods. Modern scholarship (Plann, 1993) recognizes the contributions of a Spanish monk, Fray Pedro Ponce de Léon, as the true first official educator of the deaf, although the title of "Father of Deaf Education" is still reserved to De l'Epée. In the United States, Martha's Vineyard, a small island belonging to Massachusetts, had a high degree of genetic deafness leading to a culture accepting of deafness and a sign language all their own, although they did not have a Deaf school, per se (Groce, 1985). This period, corresponding with the Age of Enlightenment, saw the foundations of what would become Deaf education (Best, 1914; Cleve, 1993; Lane et al., 1996; Nomeland & Nomeland, 2012).

American Deaf education started in the 1810's in Connecticut (Nomeland & Nomeland, 2012; Valentine, 1993). Several affluent families in the Hartford area found themselves with children who had hearing loss that rendered them incapable of participating in regular schooling. Thomas Hopkins Gallaudet, a Congregationalist minister with undergraduate training at Yale, appeared on the scene. Apocryphal stories suggested that Gallaudet became interested in educating the D/HH after he met and tried to learn how to communicate with Alice Cogswell, the deaf daughter of Dr. Mason Cogswell, a prominent figure in the community. With the backing of the Connecticut aristocracy, Gallaudet went overseas to find the secret to educating the deaf. His initial desire to educate the deaf stemmed from his ministerial background – much in the mentality that drove De l'Epée to found a school to bring religion to the unlearned deaf person. Gallaudet himself later declared that successful education and life achievement for D/HH persons is "best accomplished by leading them to seek first, the Kingdom of God" (Valentine, 1993, p. 62). This religious drive was at the heart of his principalship of the Deaf school he set

up in Hartford and, to him, the other aspects of education and job preparation were simply means to serve a D/HH person's religious duty and need for salvation.

Gallaudet's first stop was in England, to visit the Braidwood family. They were favorable towards Gallaudet's request but required a payment per pupil for the use of their method. Gallaudet could not consent to this, especially with the method sight unseen (Lane et al., 1996). He made his way to London and there saw a demonstration by Sicard (the successor to De l'Epée) and two of his most successful students, Jean Massieu and Laurent Clerc. [The school at which I currently work is named in honor of Massieu, although his contributions to American Deaf Education are less pronounced than Clerc]. This demonstration showed the success of the French "methodical sign" through the use of the audience asking questions, such as "What is the mind?", Sicard signing the question, and the Deaf persons writing the answers on a chalkboard in both French and English (Berthier & Henry, 2009). Gallaudet was so impressed he followed the Frenchmen back to Paris to learn more about their method. Satisfied that this was what he was looking for, Gallaudet soon convinced Clerc to come with him for a brief time to America to establish the first Deaf school in the New World. Of his leaving, Clerc later commented that is was important for him to go as "without much inconvenience leave [the Paris school] for a few years without loving him [Sicard] the less for it, and that I had a great desire to see the world, and especially to make my unfortunate fellow-beings on the other side of the Atlantic, participate in the same benefits of education that I had myself received from him" (Clerc, 1852, p. 4). It is believed that on the voyage to the United States Clerc taught Gallaudet sign language (Lane et al., 1996). In 1817, the American Asylum for the Deaf and Dumb was opened in Hartford, Connecticut. In the beginning, this asylum served only those wealthy enough to pay the $200 per year tuition, but by 1830 all of New England paid the tuition through public funds (Valentine,

1993). Modern American Sign Language was forged in the American Asylum through the combination of Clerc's French Sign Language, students from Martha's Vineyard bringing their sign language, students bringing "home signs" with them (signs and gesture structures used in homes when a sign language is not learned by the family), the influence of English language on signs, and the natural creation of new signs for a new institution and culture (C. N. Bailes & Tompkins, 2001; Berthier & Henry, 2009; Nomeland & Nomeland, 2012).

Much in the same way that the Paris school created offshoot schools, the Hartford school began a rapid period of Deaf school establishment based on the use of sign language (or a mixture of sign languages and visual communication systems) (Nomeland & Nomeland, 2012). In the 1860's, Congress authorized the creation of a collegiate program for the deaf in Washington, DC, overseen by Thomas Gallaudet's son, Edward Gallaudet. This school evolved to become the current Gallaudet University, the world's only "deaf" university. During the time of rapid Deaf education expansion across the US (Nomeland & Nomeland, 2012), however, the public debate about Deaf education began what is now the continuing debate of the field: oralism versus manualism (Baynton, 1993). In simpler terms, this debate can be phrased as, "Should deaf children learn through sign language or speech?"

The leaders of the fight were Alexander Graham Bell, supporting oralism, and Edward Gallaudet, supporting manualism. Their fight soon became the central issue of Deaf education across the world with each country having their own version of best practice in Deaf education. This fight came to a head in 1880 at a convention of educators of the deaf called the Milan Conference in Milan, Italy. Nomeland and Nomeland (2012) referred to this as "when all hell broke loose" (p. 50). This conference, with only a single Deaf delegate, decided that the oral method be mandated the singular method in the world in Deaf education. Some resisted this,

such as Gallaudet, creating mini-enclaves of sign language instruction in the world. However, the vast majority of schools and countries changed overnight to a non-sign language approach to education. The debate between oralism and manualism rages still today and, for now, it does not seem like the fire will cool anytime soon (American Annals of the Deaf, 2016a; Marschark, 2014; Marschark & Hauser, 2012; Nomeland & Nomeland, 2012; Spencer & Marschark, 2010).

In the past 100 years, the issue of language use in Deaf schools has been the central focus of research, debate, and pedagogy. When research suggested that D/HH students were not achieving through oral-only methods, a wide variety of manual-based approaches were used in Deaf programs across the US. Some schools began the use of visually representative systems that were not sign-based systems, such as Cued Speech and the Rochester Method (Vasishta & Tompkins, 2001). Other schools began using manually coded signed English systems, such as Seeing Essential English and Signing Exact English, among others. Some schools went with a bilingual approach using ASL as the language of instruction with an emphasis on written over spoken English, formerly called Bi-Bi (bilingual-bicultural) but now often referred to as ASL/English. Still yet, other schools adopted a system of mixing spoken English, English sign systems, and American Sign Language into an approach called Total Communication, or "TC". These systems of communication played a critical role in the lives of young D/HH children for decades and the debates about their use and efficacy ran parallel with their use (Levesque, 1990; Nomeland & Nomeland, 2012; Vasishta & Tompkins, 2001). As of now, most Deaf schools identify as either sign-based or oral-based, returning to the same argument that was used in 1880.

Deaf education of the late 1800's was a special "asylum" system unto itself, often based on religious ideals to provide for the salvation of the D/HH (Valentine, 1993). During the 20th century, however, Deaf education increasingly became part of the Special Education movement

and became subject to the laws, federal and state, that were implemented for the benefit of handicapped children and created a myriad of schooling options for disabled children where, before, only asylums existed (Bahan, 1986; Garretson, 2001; Lane et al., 1996).

Modern Deaf Education. The current state of Deaf education in the United States is founded on the linguistic debate of 1880 and the laws that became the Individuals with Disabilities Education Act (2004) (Lane et al., 1996). These foundational events gave way to the setting that the vast majority of D/HH find themselves in for their schooling. Adding to these, though, is a great deal of historical attitudes, trends, and organizations that may or may not have any research basis. Of course, there is also the culture and influence of the Deaf community within what they see as their own sphere of influence and the children that have a cultural birthright within the community.

Language is the central issue of Deaf education (Baynton, 1993; Hult & Compton, 2012; Veditz, 1913). It has been since the inception of the modern tradition of teaching the D/HH by the Abbe de l'Epee when he introduced his "methodical signs" to teaching his pupils. His successor, Sicard, prided himself on weekly "demonstrations" of his students' ability to communicate in sign language while expressing themselves eloquently in written French and English (Berthier & Henry, 2009). Two important Deaf community organizations, the World Federation of the Deaf and the National Association of the Deaf (of the United States), make it clear in formal statements that language is vital to the education of D/HH students and they believe that sign language is the more important language (National Association of the Deaf, 2016; World Federation of the Deaf, 2016) with the National Association of the Deaf stating, "direct and uninhibited language and communication access to the curriculum, and all facets of the schooling experience are essential for a deaf or hard of hearing child to achieve equality of

opportunity and an appropriate education" (2016, p. 1). This language battle returns to the 1880 Milan Conference question as to which language is of greater importance, spoken English or sign language?

Oralism, as the spoken English preferred philosophy has been called historically in literature (Berthier & Henry, 2009; Best, 1914; Bragg, 2001; Lane et al., 1996), is the philosophy of the supremacy of speech as the method of communication for the D/HH. This philosophy most often admonishes the use of sign language in favor of "listening and spoken language" communication methods. This philosophy espouses the idea that D/HH children are members of a larger hearing community, despite their handicap, and should be educated in a way that allows them to be citizens of this community. In describing this philosophy, Spencer and Marschark (2010) stated, "proponents of the various oral methods for deaf children stress the potential social, linguistic, and academic benefits children gain by being able to comprehend and produce the surrounding culture's language" (p. 53). Opponents of this philosophy see it is as unrealistic to the communicative needs and abilities of D/HH children and it robs them of the social and cultural learning from the Deaf community (Lane et al., 1996).

Manualism, as the sign language preferred philosophy has been called historically in literature, is the philosophy of the supremacy of sign language as the method of communication for the D/HH. This philosophy uses sign language, American Sign Language in the United States, as the language of communication and instruction with instruction in written English. Spoken language is stressed differently depending on the type of manualism philosophy being used: ASL/English (formerly called Bilingual-Bicultural) views spoken language as an optional choice; Total Communication views spoken language as part of the "total" system of language; Signing Exact English varies depending on the tradition of education; and other, lesser used

systems (Cued Speech, Rochester Method, etc.) vary (C. N. Bailes & Tompkins, 2001; Lucas & Valli, 1992; Vasishta & Tompkins, 2001). Cultural attitudes differ greatly in manualism, although all sub-methods of manualism agree that understanding and living within a hearing community is an expectation of living as a D/HH person. The main cultural ideological differences are in the role of Deaf culture and community; in general, ASL/English adherents believe strongly in the role of Deaf culture in a D/HH student's learning and life while other sub-methods have beliefs that differ based on locale (Lane et al., 1996; Nomeland & Nomeland, 2012). Research suggests that visually supported communication systems for D/HH students produce greater academic achievement (Marschark, 2014; Marschark & Hauser, 2012; Spencer & Marschark, 2010).

In comparing how Sweden and the United States approach Deaf education, Hult and Compton (2012) state that Deaf education policy is in fact *language* policy for both countries, although both countries differ in their approach. They cite the need for "language-in-education planning" that serves the needs of both sign language and the dominant language, and that this should be publicly discussed as in the United States "even when it is not explicit, language planning is undertaken for both sign and spoken languages," which has left a great deal of uncertainty in how American schools should educate their D/HH pupils (p. 616). There has been, at one point, however, some language-in-education planning in the United States. After the Milan Conference of 1880, the majority of Deaf schools changed their language philosophy to an oralism philosophy to the nearly complete exclusion of sign language in academic settings, although it survived quite healthily in the dormitory environment (Lane et al., 1996). In the 20th century, however, this oral-only approach to Deaf education fell out of vogue due to poor academic performance. A variety of communication approaches were undertaken, although they

all dealt with an emphasis on the use of English even if they used a visual medium and/or signs as their communication mode (Lane et al., 1996; Levesque, 1990; Lucas & Valli, 1992; Vasishta & Tompkins, 2001). Although these communication systems and philosophies were heavily thought through and researched (Gustason, 1997; Luetke-Stahlman, 1988; Luetke-Stahlman & Milburn, 1996; Nicholls & McGill, 1982; Scouten, 1967), they were not consistent in their application to Deaf schools in the way that sign language had been prior to the Milan Conference, and oralism, post-conference. At present, federal law gives tacit approval to sign language but does not promote one language or communication system over another but, rather, emphasizes the concept of "Least Restrictive Environment" (Individuals with Disabilities Education Act, 2004). These concepts will be discussed in more depth below. State laws, similarly, do not consistently provide for one language over another, although there are clear standards towards English achievement in writing, especially under the watchful eye of the Common Core State Standards (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010c), which will be discussed later in this literature review.

A majority of schools and programs for the D/HH across the United States state they use ASL or sign and speech (Total Communication), but around half of those who use ASL in their program identify themselves as "bilingual" (American Annals of the Deaf, 2016a). Bilingual education is a hot issue within the field of Deaf education. It is based on the theoretical frameworks proposed by Cummins (1979, 1989) that students, either in special education or from a linguistic minority, who are supported in the development of their native language (called L1) will be able to transfer linguistic skills to their secondary language (called L2). Cummins further expanded his ideas that in each language there are two levels of linguistic competence,

BICS (basic interpersonal communication skills) and CALP (cognitive academic language proficiency) and that a CALP level understanding of a student's L1 is essential to creating true CALP level proficiency in a student's L2. For the D/HH in the United States, this is interpreted to mean that their L1 is ASL and their L2 is spoken and/or written English – even if they grew up in a home environment that was not signing. ASL is considered the "native" language of the Deaf by virtue of it being the only completely accessible language for them (Lane et al., 1996).

There is much research to suggest that these bilingual strategies (which can be found by many names in literature such as bilingual education, English as a second language, English language learning, second language learning, etc.) align with the bilingual education philosophies and initiatives of Deaf schools. Cook (2016) discusses how L1 and L2 influence each other in both directions, allowing the languages to impact each other in both depth of learning and mistaken generalizations in both linguistic structures, which aligns with Deaf Education's reasons for bilingual pedagogies (C. N. Bailes & Tompkins, 2001; Marschark, 2014). Hummel (2014) and Ekiert and Han (2016) shared findings how L1 grammatical structures influence the writing of L2, the same as is found in the ASL-ized writing of D/HH students that contributes to their being seen as not on grade level for writing (Dammeyer & Marschark, 2016; Marc, Patricia, Carol, Connie, Loes, & Thomastine, 2009; R. E. Mitchell, 2008; Moreno-Perez, Saldana, & Rodriguez-Ortiz, 2015). In contrast with those findings, children who are exposed to bilingual practices from birth have shown that their L1 and L2 develop independently, although there is some overlap in languages present in a lesser sense as researched and theorized by Kessler and Keatinge (2009), that align with Deaf scholarship showing that Deaf-of-Deaf children (D/HH children with D/HH parents who use sign language in the home) function better in both ASL and English than peers from non-signing homes with

hearing families (Cynthia Neese Bailes, 1999; Dammeyer & Marschark, 2016; Hrastinski & Wilbur, 2016; Karchmer & Mitchell, 2004; Kritzer, 2009; Marschark & Hauser, 2012; R. E. Mitchell, 2008). This is also in line with neuroscience research from Gallaudet University, led by Laura Ann Petitto, that has shown that the age of bilingual exposure impacts the achievement and bilingual success of students (Kovelman, Baker, & Petitto, 2008a, 2008b; Kovelman, Salah-Ud-Din, Berens, Petitto, & Yates, 2015). Aldosari and Alsultan (2017) researched the influence of English language instruction in Arabic Saudi Arabian elementary schools and found that the time spent on English instruction did not harm Arabic literacy, or vice-versa, sharing notions with Deaf Education ASL advocates that learning and using ASL does not harm English language learning (Bahan, 1986; Lane et al., 1996; Laurent Clerc National Deaf Education Center, 2017; Marschark & Hauser, 2012). Petitto demonstrated this non-harm concept neurologically (Petitto, 1999; Petitto, Zatorre, Gauna, Nikelski, Dostie, & Evans, 2000) by showing that the brain processes sign language the same as it processes spoken language. Also, personal experiences shared by notable second language researcher Sibayan (1991) of learning English in a non-English speaking environment noted that "one of the secrets of our success was our isolation" (p. 295) allowing specialized focus on learning English even when English was completely unused around Sibayan; similar feelings are held by Deaf individuals about the role of English within an ASL environment (Bahan, 1986; Baynton, 1993; Groce, 1985; Levesque, 1990; National Association of the Deaf, 2016; Nomeland & Nomeland, 2012).

In considering bilingual education for the D/HH, however, it is important to note a difference in bilingual approaches with the D/HH as compared to hearing bilingual students (Brisk, 2005): the Deaf will never be able to fully immerse themselves in a spoken language environment and, thus, cannot be "subtracted" out of the use of ASL but will remain a "lifelong

member of at least two language communities – that of the majority language community that uses English, and that of the Deaf community, which uses American Sign Language" (Bailes & Tompkins, 2001, p. 137). Several Deaf schools across the United States use a bilingual ASL/English approach in their programming and many Deaf schools and programs claim a bilingual approach, although the fidelity of the L1/L2 thinking may be marred by the mixing of signed and spoken languages to create a "contact" language between ASL and English (Lucas & Valli, 1992). A bilingual approach to Deaf education may create friction, however, when programs and policies imposed on Deaf schools/programs fail to take into account the ASL primacy communication approach used in Deaf education.

A final consideration that must be made when thinking about the role of language in Deaf education is the voice of the Deaf community itself. Those who identify with the United States Deaf community overwhelmingly support the use of ASL and the role of Deaf schools in the education of D/HH children (Lane et al., 1996). An early leader of the Deaf community, Veditz, signed passionately about the role of sign language in the life of D/HH persons and in their education and called sign language "the noblest gift God has given to deaf people" (1913, p. 85). He spoke of the state of Deaf education in other countries, under the influence of the 1880 Milan Conference, saying that "the German deaf and the French deaf look up at us American deaf with eyes of envy… and they know that this superiority can be credited to – what? To one thing, that we may use sign in our schools" (pp. 83-84). This call to the preservation of sign language has pushed forward the bilingual ASL/English agenda in Deaf education, the call for Deaf equality and rights, and the labeling of the Deaf community as an linguistic minority (Nomeland & Nomeland, 2012). The attempts to ban the use of sign language in Deaf education is seen as an attempt to "eradicate" the Deaf community (Lane et al., 1996). These feelings align with second

language learning scholarship that discusses the indispensable role of culture in language learning (Caldas, 2017; Trueba, 1991).

After language considerations, the educational legislation of the United States has had a major impact on the education of D/HH students. The main legislation to consider is the Individuals with Disabilities Education Act (2004), often abbreviated as IDEA. This legislation grew out of previous laws guaranteeing the education of students with special needs, the main foundation being Public Law 94-142, the Education of All Handicapped Children Act of 1972. IDEA holds six basic principles for the education of students with special needs and disabilities: zero rejection of students who are identified as having special needs; nondiscriminatory identification and evaluation; due process safeguards; parent and student participation and shared decision making; free, appropriate public education (FAPE); and education within the least restrictive environment (LRE) for the student (Heward, 2012). These principles find their main fulfillment within a student's Individualized Education Program (IEP), a document outlining a student's current educational progress, goals for a student's continued progress, services and related services provided to a student, and accommodations made within the classroom for the student. Hearing loss is identified as a special education disability and, thus, all D/HH students have an IEP by law (Individuals with Disabilities Education Act, 2004).

The primary issue of Deaf education, under the IDEA law (2004), a refinement and reincarnation of PL 94-142, deals with the Least Restrictive Environment (LRE). The concept behind this is that a student with special needs should be placed in a school setting that allows for maximizing their potential academic and social development, equalizes (as much as possible) their education with normal peers, and minimizes the negative academic and social impacts of their disability – an environment that is *least* restrictive. IDEA provided for educational

"settings" for student placement, including: general education with minimal supports (setting 1), a special program within a general education school (setting 2), a specialized school (setting 3), a special program within a specialized school (setting 4), or home/hospital instruction (setting 5) (Individuals with Disabilities Education Act, 2004). For Deaf education, however, this placement mentality has not been appreciated or accepted by the entire field. "Those that educated deaf children, the Deaf community, and others did not always agree with the language that placed a priority on educating children in the regular classroom or least restrictive environment" (Bienenstock, 2001, p. 78). To Deaf education, this LRE law creates three potential settings for D/HH students: mainstreamed (placed in a general education school), magnet school (placed in a special program within a general education school district to create a critical mass), and Deaf school (a specialized, usually state-wide school that only has D/HH students). As language is the central issue of Deaf education, a setting for D/HH students chooses a language philosophy to use, which influences the other types of settings that may arise in a given area. For example, if an ASL/English Deaf school exists, there will also probably be a magnet school that uses an oral approach and a mainstream setting that uses a Total Communication approach. Thus, LRE is often also tied to language philosophy, although that is not how information is presented to parents or how these programs think of themselves. The characteristics of the students who use the different settings (and accompanying language philosophy) are not always similar, however, as Spencer and Marschark's (2010) research suggested,

> Demographic differences between students in special versus local schools and, within local schools, between those in special classes versus those primarily in classes with hearing peers, are striking and create significant difficulties for program comparisons. In many special classrooms and special schools in the United States, more than half of the

> students from minority ethnic groups; the opposite is true for children in general education classrooms… [and] students in general education classrooms tend to have lesser degrees of hearing loss and therefore are more likely to be considered hard of hearing than deaf. This also means that more of the students in the general classrooms use spoken language as their primary means of communication, although some require and are provided sign language interpreters. (pp. 155-156)

Before IDEA, the majority of D/HH students were educated in Deaf schools, a single setting that was usually residential, regardless of the language philosophy being used (Best, 1914). This allowed for the growth of the Deaf community and the preservation and natural evolution of ASL, even in oral Deaf schools (Nomeland & Nomeland, 2012). However, now there is concern about the number of specialized programs for the D/HH closing or being under-used as closer to home placements are often preferable to parents, even when faced with the fact that D/HH students often require "teachers knowledgeable about the characteristics of deaf and hard-of-hearing children" and how to teach those students, something that is most often lacking in regular schools (Spencer & Marschark, 2010, p. 157). The Deaf community sees Deaf schools as important to the academic, social, and identity development of D/HH children and sees mainstreaming as an isolating, culturally removing, and less than ideal educational and social option for D/HH children (Bahan, 1986; Lane et al., 1996; Levesque, 1990; Nomeland & Nomeland, 2012).

A further complicating factor in the decisions made in LRE for D/HH students is the experience of the IEP team with Deaf education and D/HH individuals beyond the student being discussed. Gallegos (2016) found that the amount of interactions an educator has with D/HH people influences their preference for placement. Specifically,

> IEP team members who reported greater levels of interaction with deaf and hard of hearing colleagues and co-workers tended to believe in the appropriateness of placement in a state special school for students who are deaf or hard of hearing. IEP team members with an MA in deaf education were likely to consider placement and services at a special state school for the deaf. Those IEP team members who believed that access to language and communication throughout the school day was important preferred placement in a state special school for students who are deaf or hard of hearing. (p. 104)

Although interaction with D/HH is shown to have a positive effect by Gallegos, due to deafness being a low incidence disability (Marschark & Hauser, 2012; Spencer & Marschark, 2010), the likelihood of an educator even meeting a D/HH person is unlikely, further compounding the impacts noted by Gallegos.

A secondary component of IDEA (2004) that presents potential issues for Deaf education is the right of students to receive a "free, appropriate public education." The term "appropriate" has long been up for debate within Deaf education. The majority of D/HH students graduate from high school with, on average, a 4th grade reading level and academics that follow closely, regardless of placement setting or language philosophy (Dammeyer & Marschark, 2016; Marc et al., 2009; Mitchell, 2008; Moreno-Perez et al., 2015; Spencer & Marschark, 2010). Along with this delay in reading, D/HH students also demonstrate a delay in mathematics. Studies have shown that even preschool aged D/HH students lag behind their hearing peers in mathematics fluency, numeracy, and achievement (Kritzer, 2009; Pagliaro & Kritzer, 2013). These gaps and lags in mathematical ability follow D/HH students throughout their academic career (Mitchell, 2008; Nunes, Bryant, Burman, Bell, Evans, & Hallett, 2009). These difficulties and delays are often exacerbated by language and communication issues, especially when using word problems

in mathematics (Hrastinski & Wilbur, 2016; R. R. Kelly, Lang, & Pagliaro, 2003; Marc et al., 2009; Pagliaro & Ansell, 2002).

Bilingual education research shows that students who are learning in their second language (L2) have delays in reading and mathematics achievement, although mathematics achievement is greater than reading achievement (Alanís, 2000; Bialystok, 2016; Collier, 1992; Prevoo, Malda, Mesman, & van Ijzendoorn, 2016; Reardon & Galindo, 2009), which parallels, although not precisely, what is seen in D/HH student achievement. What is interesting is that neuroscience suggests that mathematics is intricately tied with language in the brain but that the brain moves mathematical concepts between the languages in the brain in more fluid ways than reading (Salillas & Wicha, 2012; Yushau & Hafidz Omar, 2015). Mathematics is also more visual in nature and less language dependent than language arts (Brodie, 2006) and is, in a way, a language to itself that is more accessible than traditional languages (Kenney, Hancewicz, Heuer, Metsisto, & Tuttle, 2005).

Students who use a bilingual ASL/English approach achieve academically, and socially, better than students who use other types of Deaf education approaches (Marc et al., 2009; Marschark, 2014; Marschark & Hauser, 2012; Mitchell, 2008; Spencer & Marschark, 2010). However, this has still not solved the academic achievement issues of D/HH students; this begs a person to wonder if a 4th grade academic level for D/HH adults is "appropriate" education? In 1982, the Supreme Court heard a case of a hard-of-hearing student named Amy Rowley (Board of Ed v Rowley, 1982). Rowley consistently performed in the top-third of her elementary school class but was only hearing "60%" of the material presented in English. Rowley and her parents sought for an interpreter and were denied. The case made it to the Supreme Court where it was ruled that Rowley's educational performance met the definition of "appropriate" under the

version of IDEA at that time. Thus, “appropriate” education for D/HH students is often limited to *adequate* or *acceptable*. In 2017, however, a new Supreme Court Case, Endrew F. v Douglas County School District, changed the idea of *adequate* from “de minimus” to “reasonably calculated to enable a child to make progress in light of the child’s circumstances.” National Deaf Education organizations and contributors have begun to respond to this Supreme Court ruling (see Rosenblum, 2017), but the true impact of this ruling on D/HH students will take years to sort out.

Teachers of the Deaf. I sought to understand the pedagogy of teachers of the deaf/hard-of-hearing. Thus, it is worthwhile to take a look at the population of teachers who were part of the study. The vast majority of teachers of the D/HH are white females who are hearing (Andrews & Jordan, 1993). Similar findings have been shown since the 1970s (Bowe, 1971), the 1980s (Jensema & Corbett, 1980), the 1990s (Redding, 1997), and the 2000s (Suggs, 2007), although there have not been more recent studies with sufficient breadth of demographic information beyond deaf/hearing status. Table 1 gives a breakdown of teachers by race and gender, as reported by Andrews and Jordan (1993), which was the most recent study to look beyond deaf/hearing status only.

Table 1

Ethnic/Cultural Background by Hearing Status and Gender of Teachers

	Male		Female		
Race	Hearing	Deaf/HOH	Hearing	Deaf/HOH	Total
White	681	325	3218	414	4638
Black	41	25	265	14	345
Hispanic	22	5	67	10	104
Asian	6	3	39	6	54
Other	7	1	15	2	25
Total	757	359	3604	446	5166

Note. N=5166. Reprinted from Andrews & Jordan (1993, p. 392).

Overwhelmingly, then, the teachers of D/HH students are not D/HH themselves. There is concern that this discrepancy can lead to potential cultural bias, linguistic bias, or student-teacher misunderstandings as hearing teachers may not understand Deaf culture, language, and education or actively seek to eradicate the "deafness" in their pupils (Bailes, 1999; Lane et al., 1996; Shantie & Hoffmeister, 2000). There is also a dichotomy in the race of students that attend different school types as white D/HH students tend to be mainstreamed while minority D/HH students tend to be served in Deaf schools or programs (Spencer & Marschark, 2010), although minority students identified as D/HH have been increasing in number (Mitchell & Karchmer, 2006). Again, this can present potential difficulty for teachers of the D/HH in identifying and guiding their students who are not from a racial/cultural/linguistic background similar to the teacher. These potential racial/cultural/linguistic separations between D/HH student and teacher do not have to necessarily cause problems in the classroom, depending on the pedagogy a teacher

chooses to use with D/HH students (Harrison, 2016). As a whole, teachers of the D/HH have better attitudes towards children with disabilities and their educational needs as compared to regular education or general special education teachers (Lampropoulou & Padeliadu, 1997). Teachers of the D/HH have high levels of job satisfaction (Luckner & Hanks, 2003), but there is a great deal of attrition and turnover in Deaf schools.

Training to become a teacher of the D/HH varies by state, school, and personnel requirements. Teacher license titles and requirements for teaching D/HH students also vary by state (Geiger, Crutchfield, & Mainzer, 2003). However, formal training as a teacher of the D/HH exists, although the number of programs is limited. There are currently 63 recognized college programs in Deaf Education (although they may not use that specific title) across the United States and Canada (American Annals of the Deaf, 2016c). The majority of these programs were founded post-1950, although some notable exceptions (Boston University and Gallaudet University) founded their programs in the late 1800s, but still more than 50 years after the founding of the first Deaf school in the United States. Originally, teacher training for Deaf education meant either graduating from a Deaf school for D/HH teachers or earning a regular degree from a teachers' college for hearing teachers. Each state varies its requirements, but Deaf schools, as defined in this study, generally require a degree in Deaf education or something comparable. Programs that train teachers of the D/HH are accredited by the Council on the Education of the Deaf, a multi-member organization that serves Deaf Education programs regardless of communication philosophy. Of these 63 identified teacher training programs, the majority are accredited by the Council, although a percentage are not. The Council's standards for teacher preparation programs align with the standards of the Council for Exceptional Children and the Council for the Accreditation of Educator Preparation. The standards require

preparation in “learner development and individual learning differences, learning environments, curricular content knowledge, assessment, instructional planning and strategies, professional learning and practice, and collaboration” (Council on the Education of the Deaf, 2015, p. 1). Of the teacher training programs, only 23% of courses offered relate to “curriculum and methods,” while 20% of the courses offered relate to “general deaf education,” and the rest of the program offerings relate to peripheral concepts related to Deaf education: sign language, speech, audiology, reading, and language issues (Jones & Ewing, 2002, p. 74). This is echoed in more recent research by Kelley-King (2016), who noted that courses in the methodology of teaching are far too sparse in Deaf education teacher training programs. A study of Georgian teachers of the D/HH showed that less than 50% of teachers took training in methodology/pedagogy courses related to Deaf education (Dodd & Scheetz, 2003). Nearly all programs, though, require some kind of practicum experience for pre-service teachers (Engler & MacGregor, 2018; Jones & Ewing, 2002; Kelley-King, 2016). Furthermore, the vast majority of professors teaching in these programs are white and hearing, reflecting potential cultural misunderstandings in preparing preservice teachers (Cannon & Luckner, 2016).

When looking specifically at teachers who specialize in mathematics and Deaf Education, there is little statistical research to describe the need for these teachers, but opinion pieces clearly point to the need for these teachers (Baker & Daugaard, n.d.; The Associated Press, 2017, December 14). Looking at general education trends, though, shows that there is a nationwide shortage of teachers certified in mathematics (Ingersoll & Perda, 2009; Sutcher, Darling-Hammond, & Carver-Thomas, 2016). It would follow that the additional specialization of Deaf Education would parallel or compound the potential shortage of teachers with mathematics training; this adds an increased difficulty for quality mathematics instruction in Deaf Education.

Deaf Education Pedagogy. Based on the curriculum of Deaf education teacher training programs, as discussed above, there is clear variance and diversity in the training and pedagogical background of teachers of the D/HH; as Jones and Ewing (2002) noted, "Even though all the programs in the present study address the same body of standards, several factors imply great differences among the curricula these programs offer and the knowledge bases underlying them" (p. 76). It is also important to note that the actual K-12 education experience of teachers vary, especially in the experiences of hearing versus D/HH teachers in their formative education that leads teachers to design and run their classrooms. Thus, I conclude that there is no singular pedagogy of Deaf education, although there are some concepts that find more widespread integration in the field.

As I noted, language is the central issue of Deaf education. The language philosophy of a particular school will have an impact on the pedagogy of the teachers of that school. There are large ideological divides between proponents of spoken language and proponents of sign language in the education of D/HH students (Bahan, 1986; Cummins, 1979; Hult & Compton, 2012; Lane et al., 1996; Lucas & Valli, 1992; Marschark, 2014; Marschark & Hauser, 2012; Nomeland & Nomeland, 2012; Spencer & Marschark, 2010) and these ideological differences will influence the philosophy used in the pedagogy of teachers and the methodology, linguistically at least, used in teaching D/HH students. There are also subtle philosophical and methodological differences within the sign language supporters on how they use ASL, Total Communication, or other manually coded communication systems (Vasishta & Tompkins, 2001). I posit that these language issues form the central core of the philosophy portion of the pedagogy of teachers of the D/HH, whether teachers are aware of this within themselves or not.

Deaf education is situated within the larger field of special education, and the relationship between the two determines much of the pedagogy used within a particular school. This is most easily connected to the educational placement setting of the D/HH students. If a student is in a mainstream setting, they tend to be isolated as the only D/HH student and are part of the traditional special education approach and pedagogy. Deaf schools may find themselves on the other side of the special education spectrum more closely identifying as a "regular" curriculum and pedagogy method (as mediated through the language philosophy of the school). Other programs may find themselves in varying places along this regular education – special education spectrum. The positionality of these schools on special education will influence how teachers of the D/HH view, discuss, and meet the unique needs of their student(s).

It is also important to note the historical origins of Deaf education when discussing pedagogy. The historical tradition that founded American Deaf education finds strong roots within a religious context, as can be seen by the founding of the Paris school by a Catholic priest (de l'Epee) and the American school by a Congregationalist minister (Gallaudet). In discussing the mission of Gallaudet in founding a Deaf school, Valentine (1993) stated, "salvation was always Gallaudet's primary goal" in the pedagogy he sought for the school to espouse (p. 62). Valentine further noted that this "paternalism" was evident in all later principals of the American school, even if they did not have the same religious notions as Gallaudet. The paternalistic attitude of the need to "save" D/HH children can even be seen in the founding of the Deaf school I worked at during the beginning of this study, the New Mexico School for the Deaf. A Deaf man, Lars Larson, came from the East to establish a school because the New Mexico territory did not have any provision for educating D/HH students. He used his own money for the first several years of the school's existence until the territorial legislature later formally funded the school

(New Mexico School for the Deaf, 2016). The school I am working at during the end of this study, the Jean Massieu School of the Deaf, was also founded to "save" D/HH children. In 1999, the philosophies of the Utah Schools for the Deaf and Blind were in direct opposition to those of the Deaf community of Utah, especially the Deaf community of the Salt Lake City area. The community banded together to open a charter school for the Deaf using the language and educational philosophy espoused by the community, with the intent to "save" the D/HH children of the greater Salt Lake area from lackluster education (Kinner, 2017). I posit that this "salvation" orientation of Deaf schools still exists, although not religious in nature, in the linguistic, cultural, and service-oriented philosophies of Deaf schools and this influences the philosophy of the teachers in these schools and subtly orients their methodology in paternalistic ways.

A final widespread underlying pedagogical influence is the asylum history of Deaf schools. Originally, Deaf schools were "asylums for the deaf and dumb" and this can be seen in the sign language for "DEAF-SCHOOL" that uses the sign for "institution" rather than "school" (Nomeland & Nomeland, 2012). This, I suggest, connects Deaf education with the philosophy of Foucault (1984), who said of historic asylums, "the asylum is a religious domain without religion, a domain of pure morality, of ethical uniformity" (p. 148), which connects closely with the "salvation" theory I have already described. In Foucault's discussion of prisons/asylums, he speaks of methods of control, such as the panopticon, used to keep asylums in line. This relates in modern Deaf schools to perspectives of how the "hearing world" is attempting to control and/or eradicate the Deaf essence of the Deaf community, which finds itself centered in Deaf schools (Lane et al., 1996). As more and more Deaf schools find themselves administered by D/HH individuals, the "prisoners" who have become "wardens" may now find antagonism

towards the outside forces attempting to control the "asylum" without understanding those who reside within. Furthermore, there are continual pressures on Deaf Schools brought about by the control exerted by federal, state, and Deaf school authorities simultaneously. There is a funding piece in this, how Deaf schools are funded, but looking at a more national perspective funding varies state to state and so a single perspective on Deaf education funding will not be attempted here, although funding of Deaf schools is a continual issue in Deaf education. The main issue of control happens with the tension exerted by federal law (specifically IDEA, 2004); state law, funding, and policies (especially regarding Deaf schools); local district control over D/HH students (by federal law the local districts are the initiators of any special education processes for students); and the Deaf schools' own leadership, vision, and policies. Although not thought of in these terms, how Deaf education, especially those who believe in a manualism philosophy, responds to outside mandates on Deaf schools falls in line with the philosophy of Foucault and will influence the philosophical portion of teachers of the D/HH pedagogy.

The Common Core State Standards

History of the Common Core State Standards Initiative. The impetus for the Common Core is not based solely in recent history or educational politics. Reform efforts in U.S. education have a long history with names like Dewey (1897), Hutchins (1947), or Freire (1970) all advocating for reform in their own time periods. Tyack and Cuban (1995) noted that much of the reform effort of the past century has been cyclical in nature and the "commonizing" of curriculum across the United States has had efforts come and go over the past century. One of the most notable calls to change was the *A Nation at Risk* report (National Commission on Excellence in Education, 1983). This report called for the whole educational system to change for the better and advocated for higher quality standards to be used in educating students. At the time, several

small movements towards national standardization emerged, although they did not come to fruition (Hartong, 2015; Stern & Wood, 2014).

The next major milestone was the No Child Left Behind Act (2001). This law called for continual improvement in student learning and achievement and inaugurated the current era of high stakes standardized testing and, again, initiated discussions about the potential positive impact of a nationally common core of standards as "NCLB-era standards were criticized for being poorly structured from grade to grade" (Polikoff, 2015, p. 1185). Furthering the discussion, the need for College and Career Readiness (CCR) prompted discussion about the state of current standards in preparing students for post-graduation and saw the publication of CCR standards in many states around the nation.

The Common Core was initially spearheaded by Achieve, Inc., an educational non-profit founded in 1998 that has led and implemented several major educational projects in its time. Around the time of NCLB, Achieve, through its three main influential leaders, decided to tackle the issue of nationalized standards and began working on and advocating for the project. They were able to secure funding through the Bill and Melinda Gates Foundation, which although it does not have a voice, per se, in the Common Core, its financial influence was invaluable in the creation of the Common Core (Hartong, 2015; Stern & Wood, 2014). In 2007, Achieve found a willing partner in the Council of Chief State School Officers, who decided to move forward with researching the possibility of nationalized standards. In 2008, the National Governor's Association joined the effort and the three organizations jointly published a document outlining the vision for a common core of standards (National Governors Association, Council of Chief State School Officers, & Achieve, 2008). In 2009, there was a flurry of activity as these three organizations coordinated multiple teams made from their membership and other non-profit

entities in developing and writing the standards that would become the Common Core. During this time, the foundational concepts and ideology that qualify as the "Initiative" of the Common Core came into existence through these meetings (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2016a). Implementation was based on states joining voluntarily and, at that point, all states and districts of the United States were involved in the creation process. In 2009, the Obama administration, through Secretary of Education Duncan, signed into law the Race to the Top grant (U.S. Department of Education, 2009) that provided incentives to states to improve their educational achievement and systems. Encouragement to adopt the Common Core was part of the Race to the Top program.

The first few months of 2010 included the feedback process by states, educational organizations, and the public. By June 2010, the Common Core State Standards were published with some key supporting documents (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010a, 2010b, 2010c, 2010d, 2010f, 2010g, 2010h, 2010i, 2010j, 2010k). During the remainder of 2010 and throughout 2011, states debated and decided whether or not to adopt the Common Core. By the beginning of 2013, 45 states, the Department of Defense Education Activity, Washington D.C., Guam, the Northern Mariana Islands and the U.S. Virgin Islands had adopted the Common Core (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2016a).

Since the implementation of the Common Core, there has been a wide variety of public, political, and educational response to the standards and the initiative. As of the writing of this study, three states have left the Common Core (Indiana, Arizona, South Carolina) and several other states are debating their status with the Common Core (Pew Charitable Trusts, 2014). Initial results of the Common Core have been mixed, but there appears to be a tapering off of

achievement under the standards (Heitin, 2016). However, there is still strong support the Common Core standards and initiative (Burris et al., 2016; Henderson et al., 2015). Along with the standards, new standardized testing has been implemented that is different and more complex than previous testing, but it also more truly standardized than previous assessments in that multiple states have bought in to a single testing platform – the most common being either the Partnership for Assessment of Readiness for College and Careers (PARCC) or Smarter Balanced tests, each governed by a consortium of states and business partners.

The Common Core State Standards Initiative has seen three distinct phases since its publication in 2010: introductory phase, implementation phase, and initial standardized test phase. The Common Core State Standards were adopted in June 2010 and the next four school years, until the 2014-2015 school year, were considered an implementation period of the standards as they were adopted and initially used by states, districts, and schools. The two school years since that time saw the full implementation of the standards and the introduction of standardized testing specific to the Common Core. It can be assumed that this next phase is an acclimating phase where the testing, curriculum adjustments, resource and textbook printing, and teacher adjustments will become standard practice. Furthermore, this phase has seen several states either leaving the Common Core initiative or adapting the standards in the name of local control (Burris et al., 2016).

The Common Core State Standards. The Common Core State Standards were released to schools and the public in 2010 and were sent as two sets of standards: The Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010c) and the Common Core State Standards for Mathematics

(2010d). All but one of the states that adopted the Common Core adopted both sets of standards, with the notable exception of Minnesota (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2016b). The standards were equal to or better than the standards that had existed in states previously, with the majority being deemed "better" by groups of experts (Brenneman, 2016; Conley, 2011). Much can be said about the English language arts standards and their accompanying literacy standards for other core subject areas, but for this study I am emphasizing the mathematics standards.

The mathematics standards cover grades Kindergarten through 11th grade. These standards revise the practice of "mile wide inch deep" mathematics curriculum (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010i) where teachers would teach a wide variety of standards to little or no depth every single year, limiting the potential comprehension and building opportunities, or, worse, teachers would be unable to cover all topics yearly, thus creating uneven gaps in students' knowledge. The standards attempt to create coherence and spiral across grade levels allowing for greater depth of understanding in students. The standards also create grade bands of interrelated standards: K-2, 3-5, 6-8, and high school (9-11). The addition of kindergarten in the standards was an unusual shift for several states and the expectations proved a challenge for some teachers (Polikoff, Hardaway, Marsh, & Plank, 2016; Swars & Chestnutt, 2016), which was the experience of some participants in a pilot study I conducted in 2015. Looking at these grade bands further, 6th grade was firmly placed with 7th and 8th grades as a common set of standards, creating potential issues for those schools that do not consider 6th grade to be middle school. There have been a variety of textbooks and programs created for the Common Core, although the majority of these are not truly aligned to the Common Core (Polikoff, 2015; Tran, 2016).

Within the elementary mathematics grade band, there are four domains that are consistent with K-5: Operations & Algebraic Thinking, Number & Operations in Base Ten, Measurement & Data, and Geometry. Kindergarten contains the additional domain of Counting & Cardinality. Starting in 3rd grade, there is an additional domain of Number & Operations – Fractions. These domains focus on the foundational "number sense," understanding of data, and geometric relationships that will be built upon when algebraic concepts are introduced in the middle school grade bands. When looking at the middle school grade band, the domains of student learning are completely different from the elementary domains: Ratios & Proportional Relationships, The Number System, Expressions & Equations, Geometry, and Statistics & Probability. These standards have been internationally benchmarked and are based on the foundational principles of mathematics education organizations, like the National Council of Teachers of Mathematics, and their guiding documents. The standards were also designed based on "college and career readiness" (CCR) standards and movements that pre-date the Common Core to ensure that students who complete the standards by graduation will be adequately prepared for college without the need for remedial coursework (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010d, 2010i, 2016c). That means that standards were redesigned and distributed beginning at the high school end and working backwards towards elementary, thus providing substantial shifts (depending on state) in the lower grades (Khaliqi, 2016).

Perceived Implications of the Common Core on Education. The true impact of the Common Core will be multi-faceted and may take decades to truly see and understand. Thus, in this and the next two sections, I discuss the current *perceived* implications of the Common Core. For general education, the Common Core represents a massive shift in thinking about standards and

achievement. According to the Common Core information released along with the standards, the English language arts standards of the Common Core have three key shifts as compared to previous standards used by the states: regular practice with complex texts and their academic language; reading, writing, and speaking grounded in evidence from texts, both literary and informational; building knowledge through content-rich nonfiction (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010h). For mathematics, the three key shifts identified are: greater focus on fewer topics; linking topics and thinking across grades; and rigor: pursue conceptual understanding, procedural skills and fluency, and application with equal intensity (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010i). Along with these shifts, the new standards are nationally implemented, internationally benchmarked, and have been widely discussed and debated. Furthermore, the Common Core has opened up standardized testing to become truly standardized across states, leading to the implementation of several next generation tests (like the PARCC or Smarter Balanced assessments). These new standards have been seen as both positive and negative, depending on who is debating their merits.

There are many proponents of the Common Core (Bunch et al., 2013; Henderson et al., 2015; McNulty & Gloeckler, 2014; Schmidt & Burroughs, 2013; Shanahan, 2016; Stern & Wood, 2014). These proponents note that the Common Core standards "create the opportunity for U.S. schools to move beyond test-prep instruction that fosters shallow learning – a practice that seems to have reached epidemic proportions in recent years. Implemented correctly, the common standards and assessments can vault education over the barrier of low-level test preparation and toward the goal of world-class learning outcomes for all students" (Conley, 2011, p. 17). Moreover, these standards provide the first real opportunity to move towards

educational equality, especially in mathematics achievement (Schmidt & Burroughs, 2013). The new standards have changed the role of reading for learning beyond just the English language arts classroom and have made all teachers responsible for the use of reading to learn and reading instruction, especially for nonfiction text (Shanahan, 2016). In discussing the positive implications of the mathematics standards, Swars and Chestnutt (2016) stated, "the standards go beyond specifying mathematical content and also include eight Standards for Mathematical Practice, with an emphasis on applying mathematical concepts and skills in the context of authentic problems and understanding concepts rather than merely following a sequence of procedures" (p. 212). They further note that the Common Core can address two persistent issues in mathematics education in the United States: "middling quality of mathematics learning and unequal opportunity in schools" (p. 219). One of the main supporting arguments for the Common Core is the universality of its application in addition to the increased rigor of expectations. These standards have ended the era of "50 states, 50 standards, 50 tests" and have ushered in a new era of common collaboration, achievement, expectations for students (Iannone, 2015; Stern & Wood, 2014).

Those who speak against the impact of the Common Core note that by nationalizing standards, it takes away from the always important local control and local understanding of student needs (Stern & Wood, 2014). The issues people take with the Common Core are not, usually, about the standards, as Brooks and Dietz (2013) clarify, "The Common Core standards themselves are not the problem. In fact, the standards are aligned with the kind of constructivist teaching and learning observed in the classrooms [of notable educators]. But the Common Core State Standards Initiative goes far beyond the context of standards themselves. The initiative conflates standards with standardization" (p. 65). The difficulty comes in that the United States is

a very diverse nation with students who have unique needs that are not served by a one-size-fits-all standardization, which is not always represented in the application and implementation of the Common Core State Standards and the pedagogy of the Initiative (Bestor, 2016; Brooks & Dietz, 2013; Burks et al., 2015; Harrison, 2016; Khaliqi, 2016; TESOL International Association, 2013). With that argument, there is also a negative perception of the new structures of power the Common Core has created between "governmental, non-governmental, and private actors" that some argue have given the Common Core a commercial feel in its application to students (Hartong, 2015). This has also created a rush on Common Core labeled educational products, especially textbooks. However, these textbooks are generally just reprints of former materials that only superficially meet the expectations of the Common Core (Polikoff, 2015; Tran, 2016). There is also concern that teachers have been inadequately prepared to teach under the Common Core, although there is not consensus on what that preparation means (Burks et al., 2015; Sawchuk, 2012; Swars & Chestnutt, 2016).

Perceived Implications of the Common Core for Special Education. Special education is a unique area of education – it is almost a field unto itself due to the unique pedagogies for working with special needs students. The new expanded expectations of the Common Core State Standards are having an impact on what is expected of special needs students (Haager & Vaughn, 2013). Some special educators suggest that this is a good thing (McLaughlin, 2012; McNulty & Gloeckler, 2014). McNulty and Gloeckler (2014) noted, "the goal of the Common Core State Standards is to focus on the knowledge and skills needed by all students so they can be successful in college and careers. This goal applies for all students. Students who are receiving special education services are no exception. They, too, are expected to be challenged to excel within the general education curriculum based on the Common Core State Standards" (p.

4). It must be noted that they state that special education students must excel within the general education curriculum. To aid in understanding this, a document was co-published with the Common Core State Standards as a clarification of the standards called the Application to Students with Disabilities (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010b). The Common Core states, "these common standards provide a historic opportunity to improve access to rigorous academic content standards for students with disabilities" (p. 1). However, to show an understanding of the unique needs of special education students, "students with disabilities are a heterogeneous group with one common characteristic: the presence of disabling conditions that significantly hinder their abilities to benefit from general education. Therefore, *how* these high standards are taught and assessed is of the utmost importance in reaching this diverse group of students" (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010b, p. 1, emphasis in original). In reference to the "how," McNulty and Gloeckler (2014) described five elements to "support the achievement of students receiving special education services" under the Common Core: ownership, high expectations, intervention systems, inclusion/collaborative teaching, and organization/professional development (pp. 7-8). In a similar vein, but emphasizing the philosophy side of pedagogy more, McLaughlin (2012) presented six principles that will provide "access for all" under the Common Core for students with disabilities: recognize that students with disabilities are a heterogeneous group and require individualized education planning; distinguish between accommodations and modifications; support an environment and set expectations that teachers will understand and use evidence-based practices; augment end of year state assessments with a schoolwide assessment program

that can measure progress and growth; understand and support the alignment of IEP with the standards; and hire and support the best special educators.

Perceived Implications of the Common Core on English Language Learners. The Common Core standards represent a shift in instruction that leans heavily on the use and understanding of English print within the classroom. Although the standards formally apply only to English Language Arts and Mathematics, the English standards contain standards for the use of English for "literacy in history/social studies, science, and technical subjects" (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010c, p. 6). The use of Common Core with English Language Learners (ELLs) could prove either beneficial or detrimental to their education, depending on how people apply the standards rather than from any explicit statements or expectations contained within the standards (Bunch et al., 2013). Those who support the Common Core and its use with ELL students suggest that the way to ensure quality education for ELL students under the Common Core is to use the standards with an "effective and equitable" mindset (p. 26), which includes not only English language arts but also mathematics (Schmidt & Burroughs, 2013). In discussing the impact of the Common Core standards on ELL programs, the TESOL International Association (2013) stated, "The CCSS represent a paradigm shift in education. By including all domains of language acquisition across content areas and requiring use of complex texts and rigorous academic language, the CCSS represent both an opportunity and a significant challenge for ELLs and their teachers" (p. 10). When the Common Core State Standards were released, an addendum was created that specifically addressed the application of the standards to ELLs (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010a) in which the authors stated, "[we] strongly believe that all students should be held to the same high expectations

outlined in the Common Core State Standards. This includes students who are English language learners (ELLs). However, these students may require additional time, appropriate instructional support, and aligned assessments as they acquire both English language proficiency and content area knowledge" (p. 1). This makes it clear that ELLs are expected to achieve within the Common Core at a level similar to non-ELL students. However, the authors of the standards also noted, "Teachers should recognize that it is possible to achieve the standards … without manifesting native-like control of conventions and vocabulary" (p. 1). In specifically discussing mathematics learning, the authors of the Common Core suggested that "regular and active participation in the classroom—not only reading and listening but also discussing, explaining, writing, representing, and presenting—is critical to the success of ELLs in mathematics. Research has shown that ELLs can produce explanations, presentations, etc. and participate in classroom discussions *as they are learning English*" (p. 2, emphasis in original). Thus, under the Common Core, it is understood that ELLs require additional supports and learning opportunities but are expected to achieve in ways that are consistent with their native English speaking peers.

The Deaf/Hard-of-hearing are usually classified as special education students, rather than English language learners. However, some research suggests that D/HH students are actually more similar to ELL students and need similar teaching approaches and strategies (Paul, 2016; Saulsburry, 2014). The pedagogy of ELL instruction and special education is different, but I suggest that Deaf education needs a combination of the two, especially in light of the implications posed by the Common Core State Standards.

Pedagogy of the Common Core. The authors of the Common Core state multiple times in the standards that they do not advocate a specific pedagogy or curriculum, but, rather "establish what students need to learn, but they do not dictate how teachers should teach" (National Governors

Association Center for Best Practices & Council of Chief State School Officers, 2010c; 2010d, p. 2). Twice in the "Frequently Asked Questions" document (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010e) the authors of the Common Core mention this, stating, "teachers will devise their own lesson plans and curriculum, and tailor their instruction to the individual needs of students in their classroom" (p. 2) and "teachers know best about what works in the classroom. That is why these standards establish what students need to learn, but do not dictate how teachers should teach. Instead, schools and teachers decide how best to help students reach the standards" (p. 5). Furthermore, rather than having a set literature list, instead favoring required genres of text – "classic myths and stories from around the world, foundational U.S. documents, seminal works of American literature, and the writings of Shakespeare. These standards appropriately defer the majority of decisions about what and how to teach to states, districts, schools and teachers" (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010h, p. 1).

Although the standards seem rigid and fixed, the Common Core affirms that "the Standards are intended to be a living work: as new and better evidence emerges, the Standards will be revised accordingly" (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010c, p. 3). Additionally, nearly every document of the Common Core mentions that the standards are based on national and international research and success standards designed to ensure that all students are adequately prepared by graduation for college and careers. The Common Core seeks to be open to a variety of students, cultures, and needs.

The Common Core State Standards may not openly advocate a specific pedagogy, but the Common Core State Standards *Initiative* suggests a pedagogical shift for teachers under the

Common Core. There is a shift towards greater "complexity" and "rigor" while promoting higher order thinking, greater writing, more text comprehension – especially for nonfiction text, and greater depth of instruction and learning (Burris et al., 2016; Conley, 2011; Iannone, 2015; National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010h, 2010i; Roberts, 2016). However, with the adjusted expectations for teaching and learning under the Common Core, there has also come a slew of legislation tied to accountability, testing, and a push for visible achievement in the "new era" of the Common Core, all of which influence the pedagogical choices made by teachers and the pedagogical freedom they are afforded (Bestor, 2016; Burks et al., 2015; Burris et al., 2016; Heitin, 2016). With the multiple changes from both the Common Core and legislation connected to the Common Core, teacher beliefs about the Common Core vary widely (Henderson et al., 2015; Polikoff et al., 2016), which leads to all four types of pedagogy I mentioned in the conceptual framework for this study. My own research into the Common Core prior to conducting this study suggests that the standards are open to any type of pedagogy, more progressive educational philosophies can find harmony with the Initiative, and policy makers define the Common Core in ways that suit their own agenda (Harrison, 2016).

The Common Core and Deaf Education

The Common Core mentions D/HH students in only a single instance, and then not by group but by language. In discussing what is *not* covered by the standards, the point is made that "the Standards should also be read as allowing for the widest possible range of students to participate fully from the outset and as permitting appropriate accommodations to ensure maximum participation of students with special education needs… in a similar vein, *speaking* and *listening* should be interpreted broadly to include sign language" (National Governors

Association Center for Best Practices & Council of Chief State School Officers, 2010c, p. 6). Although there are documents referring to both English Language Learners and Students with Disabilities, there are no explicit or obvious implicit references to D/HH students in any portion of the Common Core, except for the single instance mentioned.

To date, national organizations related to Deaf education have been fairly silent on the issue of the Common Core. The American Speech-Language-Hearing Association (2016) published a short statement on the role of educational audiologists in supporting IEPs to use the Common Core. The Alexander Graham Bell Association of the Deaf and Hard of Hearing (Dolman, 2013) took an article published in their journal, the Volta Review, and posted it to their website; it discusses the shifts in English language arts and how they will impact Deaf education and the pedagogical needs of D/HH students. Other organizations do not have a formal statement or explanation of the Common Core State Standards. The two main journals of Deaf education, the *American Annals of the Deaf* and the *Journal of Deaf Studies and Deaf Education*, have published articles in recent years that make mention of the Common Core (those have been used to build this literature review) but there have been no focus articles or issues on the Common Core by these journals. A more practitioner-based journal, *Odyssey*, has published a single article (Neria, 2014) discussing the Common Core since the journal's inception in 2010.

There appears to be no scholarly literature about the intersection of the Common Core and Deaf education. There may be unpublished research or articles in press that have not come to light, although listings of Deaf related dissertations suggests that there still may be limited scholarship in this area (American Annals of the Deaf, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016) .

Neria (2014) suggested that for success in the Common Core for Deaf education, teachers must use what the author calls the "Five E's": engagement, encouragement, expectations, expression, and experience. She stated, "The implementation of the Common Core State Standards puts pressure on everyone—and there is no magical pedagogical equation to ensure students' mastery—but these five principles may be stepping stones in supporting students on this rigorous journey" (p. 8).

I also have done some research into the relationship between the Common Core and Deaf education (Harrison, 2016). Through a document analysis of the Common Core State Standards and its appendices (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010a, 2010b, 2010c, 2010d, 2010f, 2010g, 2010h, 2010i, 2010j, 2010k), I found the Common Core to be culturally neutral in a way that could allow schools and teachers to either use the Common Core to dismiss the cultural needs of D/HH students or to use a culturally sustaining deaf pedagogy in their classrooms.

Costner (2013), in a piece of unpublished academic work, suggested that "in order to raise the standards and expectations of deaf students, educators must use the CCSS as the map for student success. As deaf educators align the CCSS to the curriculum and to their lesson plans, they will begin to see the parallels of high standards and expectations in each of the content areas. Therefore, they can begin to restore their hope in the future of deaf education as they work together to find ways to align the CCSS successfully within the science, math, and social sciences" (p. 37). She also suggests some tools that will support Deaf education's successful use of the Common Core. Her suggestions for mathematics tools are shown in Table 2.

Table 2

Tools for Common Core Mathematics for Deaf Education

Considerations During Planning	Organize units to teach based on big ideas In-depth coverage of content, but cover fewer objectives Use a strand organization for lessons Ease into complex strategies Provide background knowledge for students Incorporate extra time to practice retention Plan to include frequent problem---solving work in daily lessons
Instructional Strategies	Provide frequent feedback on student performance Incorporate technology into lessons Provide clear and explicit instruction Provide appropriate and sufficient practice and review Make strategies explicit and clear
Accommodations & Modifications	Use calculators if needed Provide answers/explanations orally/in sign Give extended time Include graphic organizers to help students keep track of objectives learned Modify any materials that have reading text included
Assessments	Authentic assessments Performance based assessments instead of traditional assessments (such as paper based)

Note: (Costner, 2013, p. 42)

Chapter III: Research Design

The purpose of this study was to explore the intersection of the Common Core State Standards (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010c, 2010d) and the sub-field of Deaf education. Specifically, I sought to understand how classroom teachers' pedagogy has been impacted in this unique intersection. To provide focus and clarity, I only included elementary mathematics. The question that guided this study was, "What are the pedagogical impacts of the Common Core State Standards on elementary mathematics teachers of the deaf and hard-of-hearing?"

Research Design

To answer the research question, I used an explanatory sequential mixed methods design (Creswell, 2015). This design, simply put, begins with a quantitative data collection and analysis (a survey for this study) and then qualitative interviews, drawn from the quantitative sample, are used to help interpret and explain the results seen in the quantitative data analysis. Generally speaking, I chose mixed methods for this study due to the nature of the problem being studied. The Common Core has been adopted by a broad swath of the country and impacts the majority of Deaf schools in the United States. The breadth of the Common Core is well suited to the large sample sizes of quantitative methods. Furthermore, each region/state in the country may have had different experiences and the ability to reach multiple portions of the country with enough participants complements quantitative ways of thinking. Additionally, teachers may not be as familiar with the terminology as used in this study, especially how I have defined pedagogy; a carefully constructed instrument was designed to work around those potential issues. With all this in mind, however, some discussion should be given to qualitative methods. As defined in this study, pedagogy is part philosophical in nature and many individuals may require time and

thought to comment about and discuss their ideas and feelings, which is more easily accomplished through qualitative means. Furthermore, the rapid implementation of the Common Core and the accompanying rush of experiences and implementation meets many of the criteria for a phenomenological qualitative study (Creswell, 2013). As can be seen, both quantitative and qualitative approaches have "claim" on this particular study. I chose to use mixed methods, then, to appropriate the strength and explanatory power of both types of research. In looking at specific types of mixed methods design, I chose the explanatory sequential method due to its strong quantitative strand and the use of qualitative interviews, utilizing a sub-sample of the quantitative sample, to explain the results seen in the quantitative data (Creswell, 2014, 2015; Ivankova, Creswell, & Stick, 2006). This particular method is gaining some popularity in educational research due to the strengths I have mentioned: explanatory sequential mixed methods uses quantitative methods to see the "big picture" and the uses of qualitative methods to understand the individual piece and nuance that informs the big picture (see Koehler, Feldhaus, Fernandez, and Hundley, 2013; Zumbrunn, Marrs, and Mewborn, 2015, and Knaggs, Sondergeld, and Schardt, 2015 for examples of this method used in education research).

Figure 4 presents a model that shows the major portions of this design. Boxes show data collection and analysis, circles show interpretation of data, QUANTITATIVE in all capital letters denotes that it is the primary data collection, and *qualitative* in all lowercase italic letters denotes that it is the secondary data collection (Creswell, 2015; Ivankova et al., 2006; Morse, 1991) As seen in the figure, there were four distinct phases of the study: proto-phase, quantitative phase, qualitative phase, and integration phase.

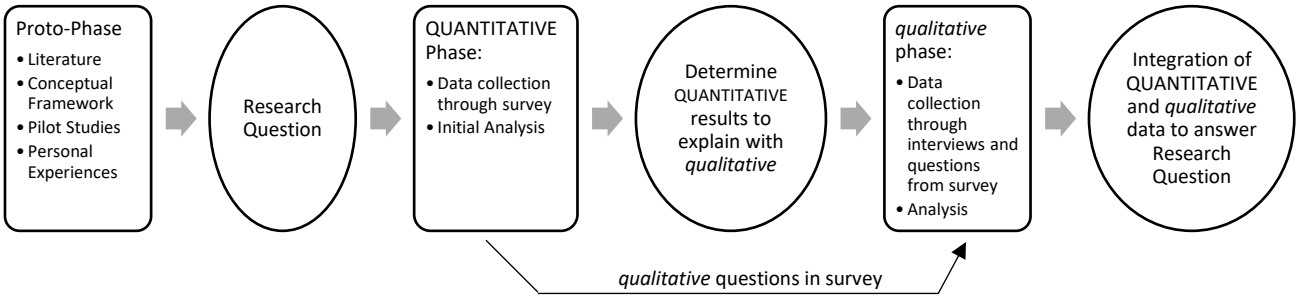

Figure 4. An explanatory sequential mixed methods design of the pedagogical impact of the Common Core on elementary mathematics teachers of the deaf and hard-of-hearing study.

Proto-Phase. Prior to this study, I took several actions that were more rigorous than preliminary research or review and, thus, can be called a "proto" phase to the study. My personal experience with the Common Core implementation at my own school left me questioning how teachers of the D/HH throughout the country have responded to the new standards. Although I believe in the intent of the Common Core, I do find that the commonality is often lost on the unique educational needs and challenges of D/HH students. My experience with colleagues piqued my interest in the experience of other teachers with the Common Core and their reactions to the new standards and initiative. Without formal study, I found my colleagues to have mixed reactions and was fascinated by how different teachers responded differently to this phenomenon.

During my doctoral course of study at the University of New Mexico, I took several opportunities to conduct studies and research that have both informed and reformed the current research question and topic for this study. Although not directly similar to the methods employed in this study, these can be correctly labeled as pilot studies. The hypotheses and findings from those pilot studies were highly influential in shaping the choice of research methods and in the creation of the instrument used in this study. I discuss later in the paper relevant pilot studies, such as the cognitive interviews I conducted to develop the instrument.

Quantitative Phase. The first research strand of the study was quantitative. This took the form of a survey of teachers in Deaf schools in Common Core states using a new questionnaire, the Deaf Education Common Core Mathematics Pedagogy questionnaire. The questionnaire was delivered using Survey Monkey as an online platform. I organized the data into a dataset within the Statistical Package for Social Sciences (SPSS v. 24) by IBM and I conducted quantitative analyses based on descriptive statistics. The following sections provide more details about these processes.

Instrumentation. As I discussed in the literature review, the Common Core has appeared to have had three distinct phases to date: introductory phase, implementation phase, and initial standardized test phase. The next phase is, most likely, the acclimating phase. Understanding these phases explains the types of existing instruments that are currently available: surveys administered to the public were used during the first two phases and, thus, are predictive in their questioning style and expectations. One exception to this is the Pew Research Center (Pew Charitable Trusts, 2014), but their instruments have not been made available to the public. Surveys of educators were few during the introductory phase but extremely numerous during the implementation phase, leading to instruments heavily focused on implementation thinking and trainings. During the initial portion of this study, we were in the initial standardized testing phase and began moving to an acclimating phase, therefore there was, at the time, very little literature or instruments that emphasize the widespread acceptance (institutionally, at least) and use of the Common Core. Further, there are essentially no survey instruments that have been used under the Common Core. Thus, I could not find an existing instrument that I could directly use or easily adapt to the current context, although several instruments did serve as a basic foundation for the

development of this instrument (EPE Research Center, 2012; Governor's Council on Common Core Review, 2015; Scholastic & Bill and Melinda Gates Foundation, 2014; Underwood, 2015).

This instrument contained four sections: demographics, beliefs, methodology, and additional comments. Please refer to Appendix A for a copy of the instrument. The initial section, demographics, is a staple of questionnaires, although I designed the questions drawing on my own hypotheses and tradition in Deaf education research. The final section is an opportunity to collect qualitative responses from participants, which informed the qualitative phase of this study. The middle sections, beliefs and methods, come from the operating definition for pedagogy in the Conceptual Framework for this study – pedagogy is the combination of teacher's beliefs/knowledge about teaching and the methods they apply while teaching. For these two sections, I developed indicators/objectives to clarify the questions needed and the purpose of asking those specific questions (De Vaus, 2014); Appendix A contains the indicators/objectives.

The demographics in Deaf education-related surveys tend to follow a similar pattern (see Peneston (2012) for an example) and this instrument followed those established norms. As the field of Deaf education is quite small, special care needed to be taken to protect the anonymity of participants in this study. For that reason, questions such as years of service, gender, and grade taught were carefully weighed as to their necessity and how data could be used to potentially identity participants. Also, participants' states have been categorized into Gallaudet regions. Gallaudet University is considered the central hub of Deaf education policy and innovation, and thus many Deaf schools classify themselves in terms of the regions designated by the university; although Gallaudet has not released the rationale for the specific geographies of their regional outreach centers, there is clearly reasoning behind the groupings that follows common

assumptions about similarly thinking and acting portions of the country (Gallaudet University, 2015). Originally, gender was purposely removed as a variable (male elementary teachers in Deaf Education are too easily identifiable as there are noticeably few). During the proposal of this study, however, my committee and I discussed at length the fact that gender does have an impact on the pedagogy of teachers (Acker, 1995; Dee, 2007; Martin & Marsh, 2005; Thomas, 2006). With this discussion and literature in mind, I chose to include gender as a variable, counting on the design of questions and choice of demographic information to protect participants. Most of these demographic questions followed hypotheses that I have developed from the literature review, pilot study, and personal experience during the proto-phase, which are shown in Table 3.

Table 3

Hypotheses of the Study Related to Demographic Questions

Lower elementary teachers have more negative perspectives of the Common Core.
Newer teachers are more accepting of the Common Core.
The hearing status of teachers influences their perceptions of the Common Core.
The sign language ability of teachers influences their success with the Common Core.
Different regions of the country have different perceptions of the Common Core.
Schools with more spoken English-based communication philosophies are more accepting of the Common Core.
Teachers with more training in mathematics and/or the Common Core are more accepting of the Common Core.

For the beliefs section of the instrument, I drew from the many sources listed above for both Common Core and Deaf Education studies and organized questions to meet the objectives I developed for that section, listed in Table 4. The methods section of the instrument was more

difficult to design as surveys before the current phase were not able to ask about the methods used in classrooms by teachers as they were still in introduction and/or implementation phase for the Common Core. Therefore, this section began with my developing objectives, rooted in the literature about teaching elementary mathematics in D/HH settings (Kritzer, 2009, 2012a; Lange, Lane-Outlaw, Lange, & Sherwood, 2013; Pagliaro, 1998; Pagliaro & Ansell, 2002; Pagliaro & Kritzer, 2010, 2013), and then writing new questions to match the objectives, as shown in Table 4. The Likert Scales used in writing most of these questions were drawn from a list of samples (Brown, 2010), and 5 point scales were chosen for their more common usage and differentiated but not exaggerated levels they create. However, feedback from my dissertation committee changed the beliefs section's Likert Scales to a 4-point scale to eliminate the easily assumed "neutral" middle option. The beliefs section used "agreement" scales to measure belief while the methodology section used "frequency" scales to measure teaching approaches.

Table 4

Objectives for the Beliefs and Methodology Sections of the Instrument

Beliefs Section	Understand what teachers think/feel about teaching in general.
	Understand what teachers think/feel about teaching mathematics.
	Understand what teachers think/feel about the Common Core.
	Understand what teachers think/feel about the Common Core and Deaf Education.
Methodology Section	Understand what teaching approaches are used to teach mathematics.
	Understand the teacher's perceptions of using the Common Core in teaching.
	Understand the teacher's perceptions of standardized testing in the classroom.

Cognitive Interviews. I conducted cognitive interviews to refine the initial drafts of the instrument. The style of the cognitive interviews was a "retrospective" "think-aloud" with a participant one-on-one (Haeger, Lambert, Kinzie, & Gieser, 2012; Willis, 1999) using the language of their preference (ASL or spoken English). The discussion began with the instrument in general and the feelings/ideas/understandings it elicited. I also asked the participants to "guess" the research question for the study – with all participants giving responses fairly close to the research question of this study. The interview then proceeded through the items of the instrument; I asked probing questions when I deemed it be appropriate to aid in my understanding of the participant's understanding and perception of the instrument. Participants were four teachers at the New Mexico School for the Deaf who meet the regular criteria for the sample, listed in the next section. I chose these participants because it was easy for me to access them, for their willingness in the past to participate in research activities, and due to their representativeness of the assumed population. Table 5 shows the most pertinent characteristics of the participants: hearing status, grade level taught (divided into lower elementary, K-2, and upper elementary, 3-5), and gender – although gender is not a characteristic that was initially intended to be studied, it may have had an impact on the participants' understanding of the instrument, and was thus included before decisions had been made regarding the inclusion of gender as a demographic characteristic. The participants are also considered to range from "minimally effective" teachers to "exemplary" teachers by New Mexico educational evaluation rubrics, but these characteristics will not be reported and only serve to aid in the potential representativeness.

Table 5

Characteristics of the Cognitive Interviews Participants

	Participant 1	Participant 2	Participant 3	Participant 4
Hearing Status				
Deaf		X		X
Hearing	X		X	
Grade Level				
Lower Elementary	X			X
Upper Elementary		X	X	
Gender				
Female	X	X	X	
Male				X

Note: Lower elementary was defined as grades K-2 and upper elementary was defined as grades 3-5 for the cognitive interviews.

The main unforeseen problem in the instrument was the question related to hearing status. This question is considered a standard question in Deaf Education related surveys and so must be included. However, participants noted that the question can be answered from either a cultural or a medical perspective, which can offer subtly different answers. The cultural perspective was chosen. Another issue arose with regards to the questions on methodology that referred to "my students" or "my class." The diversity of a classroom makes it impossible to lump all students into a single category, thus the questions were revised to refer to "the majority of my students." Other suggestions from the participants in the cognitive interviews were about the grammar or

structure of the questions and those suggestions were included in the revised questions. The first participant felt strongly that additional comment boxes needed to be included in each section instead of just at the end of the instrument. In subsequent interviews, I asked if participants would want those additional boxes; feedback was mixed but generally positive and so I included additional comment boxes. In general, the participants found the instrument to be thought provoking and a worthwhile experience. They also gave feedback on incentivizing, discussed in more depth in the Administration of the Questionnaire section. Please refer to Appendix A to see the finalized version of the instrument.

Sample. I sought to look into a fairly small portion of the American education system, Deaf Education, while simultaneously looking into one of the most widespread aspects of current American Education, the Common Core. Looking first at the population and then sample of Deaf education, there are two types of settings with three main communication philosophies that define educational programs for D/HH students: mainstream settings and special school settings; ASL/English, Total Communication, and Listening & Spoken Language communication philosophies. The federal law governing the placement of D/HH children is the Individuals with Disabilities Education Act (2004), more commonly called IDEA. Mainstream settings are settings 1 and 2 under IDEA and involve a student being placed in a regular public school with supports, such as interpreters or self-contained classrooms. I chose to not use this setting for this study as the teachers involved may not consider themselves "teachers of the deaf" as they often are regular teachers with a singular student in their classroom or the teachers who are "teachers of the deaf" focus on more broad pull-out support services rather than content specific areas. Also, I chose not to use this setting as the highest academic functioning D/HH students in this setting are typically treated or considered as "normal" students rather than being part of a Deaf

education setting and approach. Thus, I used special school settings, setting 3 under IDEA, and which are normally called “Deaf Schools.” For the sake of a broader understanding in this study, I elected to not eliminate any of the communication philosophies. To select these schools, I used the 2016 “Educational Programs for Deaf Students” published by the American Annals of the Deaf, the publication considered to be the premier listing of Deaf education programs in the United States and Canada and the traditional go-to source for studies involving Deaf schools and programs.

This study focused on elementary mathematics in Deaf schools. The Common Core has standards from Kindergarten through 11th Grade, and so the study included Kindergarten upwards. Elementary schools differ in their determination of the last grade in their school, so elementary schools may end at either 5th grade or 6th grade. Thus, this sample included teachers from Kindergarten to 5th/6th grade, depending on their own school’s definitions. These one-year differences did not appear to change the overall results of the study as teacher pedagogy and experiences are, most likely, not drastically different for an elementary 5th or 6th grade teacher.

I intended to examine the influence the Common Core has on elementary mathematics teachers. Thus, this sample only included states that used the Common Core at the time of the study; thus I excluded Alaska, Indiana, Minnesota, Nebraska, Oklahoma, South Carolina, Texas, and Virginia (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2016b). Also, as I intended to look at Deaf schools, several states were excluded as they do not have Deaf schools that meet the criteria. Several states have already been excluded by not using the Common Core and so I excluded three additional states, Nevada, Vermont, and Wyoming (American Annals of the Deaf, 2016a).

To be both representative and to achieve a high confidence level in the data, I sought a large sample, which would provide greater statistical strength, from across all regions of the United States. However, Deaf education is a relatively small field, especially when focusing only on Deaf schools. Thus, I attempted a census of all elementary math teachers of the deaf that are employed in the schools that meet the previously described criteria. There are 123 Deaf schools across the country that are in Common Core states. I surveyed 87 Deaf schools across the United States, concentrated mostly in the Eastern United States, as defined by the criteria above and used the "Educational Programs for Deaf Students" (2016) to identify schools. The reasons for the discrepancy between 123 and 87 are that most of the excluded schools had a self-contained D/HH preschool program that then mainstreams the students in elementary, not meeting the criteria; some Deaf schools are secondary only, not meeting the elementary requirement; and some of the programs have become defunct since the publication of the "Educational Programs for Deaf Students" (American Annals of the Deaf, 2016a). This discrepancy only become apparent during preparations to distribute the survey.

At present, there is no reliable way to know how many teachers are members of this population and the yearly population of these teachers varies based on school needs. However, assuming that each school only has one teacher per grade, Kindergarten through 5th, gave me a low estimate of 738 teachers; assuming an unlikely but possible scenario of each school having two teachers per grade, Kindergarten through 6th, gave me a high estimate of 1,722 teachers. These numbers were calculated using the 123 school count. Using the revised 87 school count of having only one teacher per grade, Kindergarten through 5th, gave a low estimate of 522 teachers; the high assumption for 87 schools of two teachers per grade, Kindergarten through 6th, gave a high estimate of 1,218 teachers. However, I believe that the true current population is

closer to the lower estimate and below the median of the two 87 schools estimates, 870 teachers. Using these theoretical minimum and maximum numbers for 87 schools, for a 95% confidence level I sought between 222 and 292 respondents to accurately represent my population, based on the use of an online calculation tool (Creative Research Systems, 2016). However, I only received 60 respondents to the survey, well below the statistically significant goal. This resultant sample is discussed more in detail in Chapter IV.

Administration of the Questionnaire. As mentioned above, being able to count or contact individual teachers at the Deaf schools that meet the criteria for this study would have proved to be nearly impossible. This was partly due to the inaccessibility of the data: lack of teacher listings, teachers listed as "teacher" rather than their specific grade level or position, information had not been updated, or contact information was not publicly available. Further complicating dissemination of the questionnaire, there was no feasible way I could visit all 87 proposed schools across the United States due to funding and time constraints. Information that was available, however, was the contacts of the schools' administrators, provided both on school websites and printed in the "Educational Programs for Deaf Students" (2016). Following a multistage sampling approach (Creswell, 2014, pp. 158-159), I contacted superintendents, directors of instruction, and elementary principals. Schools may use different titles, but those contacted were administrators filling positions similar to those listed. Not every school had all three position types listed and so the exact number (1-3) of contacts per school varied. Some schools had gone to a less direct system using a single contact email or form, which added an additional step in contacting the administrators of those schools, in some cases limiting the timing and quality of contact.

In deciding whether to use paper or electronic surveys, I opted to use electronic as they are easier to disseminate and, currently, result in higher response rates (Creswell, 2014; De Vaus, 2014; Vogt, 2007). I was able to send the welcome letter in the text of an email with the link to a Survey Monkey form of the questionnaire (see www.surveymonkey.com), as shown in Appendix A, and a request to forward the email to all elementary mathematics teachers. The administrators' act of forwarding the email also constituted a tacit approval for participation of the school's staff in the survey. I contacted schools in groups of 5-10 per evening over the course of two weeks, partially to avoid spam-filter difficulties of emailing large groups. I used my University of New Mexico email and a constructed form letter with attachments of the letter in PDF form as well as the informed consent with UNM IRB approval. This took place early during the spring semester of 2017, providing teachers with a half-school-year of experience with the Common Core and mathematics instruction, providing better quality data. After two weeks, schools were contacted in one large email group to remind them to participate in the study. The Survey Monkey questionnaire remained open/active for one month, as after that time it was unlikely that individuals would remember or be interested to participate.

Dealing with emails rather than live contacts created potential multi-stage sampling response rate issues where at each cluster there existed possible barriers to adequate response rate – initially: a percentage of email servers may have blocked my email; next: a percentage of administrators may have ignored the email and a percentage of administrators may have forgotten to forward the email; then: a percentage of teachers may have ignored the email, a percentage of teachers may have forgotten to respond to the survey, and ten respondents began the survey but exited within the first few questions. All these factors had the potential to compound the difficulties with obtaining an adequate response rate.

The issue at the first level was one of emailing. I used the UNM email address, which as an ".edu" address was more likely to penetrate filters and the methods I used in emailing (timing, phrasing, amount of email addresses included per email, etc.) also affected this block in positive ways. The second level issue is administrator interest, or the lack thereof; I attempted to appropriately word and design my email to capture interest and I attempted to make the survey appear worthwhile for their teachers. The third level issues are ones of teacher interest; I attempted, again, to word and design the email and questionnaire in engaging ways. I also incentivized teachers, which helped, potentially, to alleviate the level two and three issues, by providing a drawing for four $20 gift cards that the respondents were able to opt-in to by either email or using a link at the end of the survey to a different questionnaire, allowing for full anonymity of participants in my data collection. See Appendix B for the letter of informed consent for this portion of the study.

Data Construction. One of the benefits of using a survey platform, in this case Survey Monkey, is that the raw data comes in a pre-populated spreadsheet that is ready for manipulation. This raw dataset was split into two datasets. The first, and main, dataset is all but the qualitative questions and I used quantitative data analysis approaches to analyze those data. The second dataset, containing the qualitative questions, required qualitative analysis in conjunction with the second phase of this study, stratified random sampling of willing participants to conduct interviews (Creswell, 2013; De Vaus, 2014).

The raw dataset from Survey Monkey was not in a form that could be exported into SPSS. Much of the data recorded by Survey Monkey were the words from the Likert scales used in the survey, and those variables were recoded into numeric values (0 being the lowest amount of belief/action and 3 or 4 being the highest). Several variables were yes-no and so needed to be

recoded into 0 = no, 1 = yes. After discussions with some members of my dissertation committee, I recoded several variables due to the categorical nature of the data to further support meaningful data analysis. Several sub-sections of the instrument naturally lent themselves to creating composite variables that aided in seeing more holistic views of the data and the sample.

Only cases that did not contain responses past the demographics section were eliminated from the dataset. Although demographic information is useful, this study focused on the pedagogy of teachers and, thus, needed responses dealing with either beliefs or methodology to give meaning to the research question of the study. I chose not to eliminate cases that contained demographics and philosophy but not methodology, as all participants who started a section completed it, meaning that although a case may not have contained methodology data, the other two sections contained complete sets of data and did not provide a partial set of data that could have created complications. Also, because beliefs and methodology are separate constructs, I analyzed them separately, thus having a complete set of one area's variables were sufficient for the purposes of this study and I did not eliminate cases.

Data Analysis. This study, as it was exploratory in nature and contained a relatively small sample, focused solely on descriptive statistics. I calculated cross-tabs of demographic information with single and composite variables in an attempt to understand the trends occurring in both the philosophy and methodology of teachers. Of course, in using descriptive statistics, key variables were analyzed using standard analysis methods of frequency totals, mean, median, mode, range, skew, kurtosis, and standard deviation.

Qualitative Phase. This study used an explanatory sequential mixed methods approach. The first strand was quantitative in design and yielded results that needed further depth from the qualitative strand. The next strand was qualitative in design and was used to explain the initial

findings of the first phase. The qualitative approach being utilized in this study was phenomenology. According to Creswell (Creswell, 2013), “a phenomenological study describes the common meaning for several individuals of their lived experiences of a concept or phenomenon” (p. 76). The Common Core is the phenomenon being studied, as it occurred nearly simultaneously to the 87 schools of this study. The teachers of the D/HH participating in the survey and interviews are the individuals who have the “lived experience” of this phenomenon. Other qualitative approaches were considered and had potential merit in this study, but phenomenology provides the clearest approach to the research methods, aims, and population of this study.

Sample. By using explanatory sequential mixed methods for this study, the sample was mostly determined by the sequential nature of the design by drawing on a sub-sample of the quantitative sample (Creswell, 2014, 2015). At the end of the survey instrument used in the quantitative phase, I asked participants, through a link to a separate instrument, if they were willing to participate in interviews; if they were willing, they submitted identifiable information via the separate instrument where name, region, and email address were collected. To assist in the representativeness of the sample, I chose to use stratified random sampling (De Vaus, 2014; Vogt, 2007). The strata were the four Gallaudet regions of the country and two participants were randomly selected per region using the random feature of Microsoft Excel. Participants were incentivized for their participation with a $20 gift card, but this was only made known to participants after selection to ensure that participants volunteer for interviewing based on a desire to participate in the research generally and the incentive was used to help ensure those selected followed through with the interview, in addition to gratitude for their efforts in arranging a time

for an interview. One participant selected from the South was initially interested in an interview, but did not return any emails. The third person on the list for the South region was then selected.

Interview Protocol. I contacted the selected participants by email, arranged a time for an interview of approximately 15 to 30 minutes, and gave participants a new and separate participation agreement (consent form), as shown in Appendix B. I allowed participants to choose the language (spoken English or American Sign Language) that they prefer to use, regardless of hearing status. I recorded all interviews for transcription and/or translation. Participants using spoken English were interviewed and recorded using a recording application on my private cell phone. Participants using ASL were interviewed and recorded using Sorenson video-phone software using my school assigned video phone account (as a hearing person I must use an educationally assigned account rather than establishing a personal or separate account) and recorded via a screen capture software. Participates were reminded of the recording before beginning the interview process. I personally interviewed all participants and participants were aware of my name, work position, and research goals. I conducted semi-structured interviews (Creswell, 2013, 2014; De Vaus, 2014) including key questions designed during the proto-phase of the study and refined after receiving quantitative data (although questions had to be semi-fixed due to the nature of institutional review procedures), clarifying questions, and additional comments by researcher (myself) and participant. Refer to Appendix C for the interview protocol and Appendix B for the letter of informed consent for this portion of the study. Spoken English only interviews were transcribed by myself. ASL interviews were translated into written English, and translation considerations are discussed below.

Translation Considerations. It was necessary for me to translate into written English the interviews I conducted in ASL. Traditional translation strategies employed in research require

forward and backward translation of the interview to ensure objectivity, as well as, validity and reliability (Filep, 2009; Halai, 2007; Harkness & Schoua-Glusberg, 1998; Maneesriwongul & Dixon, 2004). In considering translation, however, it must be acknowledged that I am a member of the dominant hearing society and need to be culturally sensitive and very careful in the translation process, as well as involving members of the minority Deaf community in these translations. Deaf people have a long history of oppression by the hearing, especially linguistic oppression (Lane et al., 1996). As a hearing researcher, I must be critically aware of my actions and that I must act *with* the Deaf community in the use of their language rather than acting *on* the Deaf community. Temple and Young (2004) make note that "there is no neutral position from which to translate and the power relationships within research need to be acknowledged" (p. 164). They further explain that, specifically referring to hearing researchers acting as both researcher and translator, "when hearing researchers, regardless of their fluency in BSL [sign language], fulfil both roles (the researcher/translator) this very embodiment raises, for Deaf producers and consumers of research, what has been described as the 'whiff of colonialization'" (p. 169). They further elaborate two issues: reinforcing "dominant inter-community" power relationships and valuing the native and non-translated language of the participants can both occur in the process of translation, especially for D/HH participants. To help alleviate social justice concerns while still maintaining validity and reliability in translation, I used the following translation protocol:

1. Initial forward translations were made from ASL to written English by D/HH interpreters who are certified by the national Registry of Interpreters for the Deaf (see www.rid.org) as Certified Deaf Interpreters – Deaf individuals who are certified in interpreting for

D/HH clients and are familiar with cultural, linguistic register, and Deaf rights issues of interpreting and who are familiar with educational interpreting.

2. I performed "backwards translation" of the initial translations to verify the translations. I had arranged that any concerns or discrepancies would be reviewed by D/HH educators who are familiar with the level of academic rigor required by this study. However, there were no concerns or discrepancies.
3. Participants were given a copy of their transcript and allowed to comment on the appropriateness, accuracy, and linguistic register of their words in the transcript. It was planned that any changes could be incorporated into the transcript and only then will the transcript be considered valid for analysis. The three Deaf participants agreed with the translations and approved them without the need for changes.

It must be noted that any act of translation sadly, but unavoidably, loses some subtlety and nuance in the responses of the participants. Using the given translation protocol, I made every attempt to keep the maximum amount of meaning, within culturally appropriate contexts, to ensure the greatest amount of meaning in the data analysis. However, it must be noted that ASL, as with other sign languages, is a three dimensional "motion" language where facial expression, movement direction, and speed of signing all add incredibly rich details and depth that may be impossible to capture within the auditory-based, two dimensional, written form of English due to the fact that by translating signed language "interview data into written English one is also 'freezing' a text that is otherwise in constant movement" (Temple & Young, 2004, p. 165). However, until a dissertation can be satisfactorily completed in ASL or until all academic readers are fluent in English and ASL, these are the constraints the field of Deaf education must accept in academic research.

Data Analysis. The raw data used in the analysis consisted of the interviews conducted during this phase of the study and written comments contained within the survey instrument used in the quantitative phase of the study. These data were fed into a qualitative data analysis software tool, MAXQDA (see www.maxqda.com), to ease in organization of the analysis. The procedures of the data analysis followed a traditional qualitative analysis methodology (Miles, Huberman, & Saldaña, 2014) situated within the explanatory sequential mixed methods design. First, the data was given a first cycle coding using descriptive, in vivo, process, values, and evaluation coding styles. Due to the sequential nature of the design, the codes were highly influenced by the questions, hypotheses, and ideas generated during the initial analysis of the quantitative data. Examples of these influenced codes were: language difficulties, ASL use, negative feelings, positive feelings, student achievement, and Common Core changes. Next, the codes and major data quotes were given a second cycle pattern/thematic coding. These major themes constitute the analysis of the qualitative data and are discussed in Chapter IV.

Integration Phase. The integration phase is where the *mixed* part of mixed methods truly happens and is considered an essential component in mixed methods (Creswell, 2014, 2015). This study, as has been repeatedly noted, used an explanatory sequential mixed methods design. Thus, the integration of the data from both quantitative and qualitative phases serves to explain the results found within the quantitative data by use of qualitative data. This explanatory integration is one of the four methods of integration used in mixed methods research (Creswell, 2015, p. 83). The specific method for integration was a side-by-side table of quantitative and qualitative data based on the key themes (Creswell, 2015, p. 85). It is during this integration phase that I attempted to answer my research question, “What are the pedagogical impacts of the

Common Core State Standards on elementary mathematics teachers of the deaf and hard-of-hearing?"

Validity and Reliability

The concepts of validity and reliability are essential in conducting good research. This study used a mixed methods design, and so validity and reliability need to be discussed for each of the data collection and analysis phases: quantitative, qualitative, and integrative.

Quantitative Validity and Reliability. This study used explanatory sequential mixed methods, which means that the quantitative data of the study are the backbone of the entire study. Thus, addressing validity in the first phase was very important. Quantitative research methods generally define three types of validity: criterion, content, and construct (Carmines & Zeller, 1979; De Vaus, 2014; Jaeger, 1993; Muijs, 2004; Vogt, 2007). Criterion validity, for this study, is that the instrument actually measures the criterion of pedagogy, as defined in this study. Content validity, for this study, is that content of the instrument is aligned with the objectives and definition of pedagogy used in this study for both the Common Core and Deaf education. Construct validity, for this study, is that the defined construct of pedagogy used in this study, as related to the Common Core and Deaf education, is being measured clearly by the instrument. These validity issues have been addressed in the design of the study and instrument and were also addressed in the analysis of the data. This instrument was developed following design strategies that are research-based (Vogt, 2007) and by looking at a variety of related survey instruments, although there is no preexisting instrument. I designed the instrument using relevant research from the fields of pedagogy, the Common Core, and Deaf education. I subjected the instrument to cognitive interviews with a sample of participants from the population I sought to understand. The instrument was also reviewed by individuals with knowledge of survey research

methods, teacher pedagogy, and Deaf education. In data analysis, I conducted validation or reliability testing of the instrument by estimating Cronbach's Alpha reliability coefficient (Vogt, 2007); please refer to the Instrument section in Chapter IV for further discussion.

Qualitative Validity and Reliability. Qualitative reliability and validity are often seen as more ambiguous than for quantitative data. Thus, my discussions of qualitative validity draw on two sources, Creswell (2013) and Miles, Huberman, and Saldana (2014). Creswell provides eight validation strategies for qualitative research and suggests that "researchers engage in at least two of them in any given study" (p. 253). The first strategy I employed is "triangulation," by using mixed methods there are already multiple data sources to analyze and qualitative data were collected in both the quantitative phase through qualitative open-ended questions and through the second phase interviews. I also conducted an on-going review of literature during data collection and analysis to further elaborate and add detail to the existing body of literature I am using to help in understanding the data. As this study relied on explanatory sequential mixed methods, the qualitative phase connects back to the quantitative phase and the participants in the interview had participated in the survey, allowing themselves to ponder their pedagogy and the Common Core before the interviews.

The second strategy employed is "clarifying researcher bias." In the introduction chapter of this study, I clearly defined my positionality as a researcher and bracketing my biases is part of the research design of this study. These bracketing strategies were woven into every portion of the study and key areas that could show more bias, interview protocol and translation strategies, had more clearly defined systems.

The third strategy is "member checking," where all translations/transcripts were verified by participants before analyzing and participants of the interviews were given an opportunity to

provide feedback on the findings of the study. The feedback from participants seemed to show validation of both the findings of the study and the experiences of the participants. Part of member checking not discussed by Creswell, I suggest, is the accuracy of translations. This was addressed in the translation protocol of this study.

The final strategy to be employed is "rich, thick description," where detail about the participants, data, and findings were made with enough depth to allow for readers to make justifiable decisions about the study's transferability (Miles et al., 2014, p. 314). Furthermore, the initial proposal for this study leaned towards four participants, but in viewing the limited sample size of the quantitative phase, I chose to increase the number of participants to eight (the most suggested by Creswell (2015) for this type of study) to allow for the depth of description.

Miles, Huberman, and Saldana (2014) divide validity into two categories: internal and external. They define internal validity using the synonyms "credibility" and "authenticity." They use a 12-point list to guide the researcher to check or question data collection and analysis procedures (pp. 312-313). I have followed these points in research design. They define external validity by the synonyms "transferability" and "fittingness." External validity uses a 10-point list to guide researchers in both data collection and analysis procedures in a similar fashion to internal validity (p. 314). I have followed these points in research design, as well. Although, due to the exploratory and relatively small sample of this study, generalizability of this study should still be taken with caution.

Integrative Validity and Reliability. The summation of this study is found in the integration phase, which is where the question of the study was attempted to be answered, and the research design did not allow before that point. Initial validity threats for this phase are the validity and reliability of both the quantitative and qualitative data. Those threats have been addressed above.

Creswell (2014, p. 225) explained that there are additional threats to validity for explanatory sequential mixed methods. First, I needed to carefully "consider and weigh all the options" of what needs to be followed up from the quantitative results for the qualitative interviews and was discussed in the previous section. Second, "attention may focus only on personal demographics and overlook important explanations that need further understanding." This is partially addressed through the conceptual framework definition of pedagogy that is only partially based in demographic data and guides the analysis beyond just the differences between teachers. Also, this is partially addressed in the previous threat in how the qualitative interview protocol is established. Third, there may have been different samples used in each phase or either phase may have an inadequate sample size. These concerns were attempted to be addressed through the sampling criteria that have been discussed in both the quantitative and qualitative phases. The quantitative sample was too small for inferential statistical analysis, but it did allow for the exploratory nature of the study and statistical analysis outside of descriptive statistics was not undertaken. The second sample, for the interviews, was increased to 8 to allow more depth and all stated in the interview that they had participated in the survey. Finally, one phase may be inadvertently valued over another, negating the "mixed" methods design. This threat has been addressed by specifically noting the need for integration of the two data sets and treating integration as an entire phase of this study, mandating the use of both methods in creating the final results of this study.

Chapter IV: Results

This study explored the unique intersection of the Common Core State Standards (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010c, 2010d) and Deaf Education, specifically looking at the pedagogy of teachers of the deaf and hard-of-hearing (D/HH) as influenced by the Common Core. The guiding research question for this study was, "What are the pedagogical impacts of the Common Core State Standards on elementary mathematics teachers of the deaf and hard-of-hearing?" This study utilized explanatory sequential mixed methods (Creswell, 2015), where a nationwide survey was sent to teachers of the D/HH in Deaf schools in Common Core states during April 2017 followed by interviews with eight willing survey participants during May through August 2017.

The results of both the quantitative survey and qualitative interviews are presented in this chapter. Keeping in line with the methodology of mixed methods (Creswell, 2014, pp. 230-231; 2015, pp. 82-87), after presenting the separate data streams of quantitative and qualitative, I integrated the data to provide a more coherent and clear picture to aid in answering the research question of this study. It is important to consider that this study was exploratory in nature, and thus, caution should be used when attempting to use the data of this study to make any future predictions or to fully describe the population of this study (teachers of the D/HH in Deaf schools in Common Core states). However, this study does have a high degree of representativeness to the population being studied and, so, this data can serve as a guide to the population, raise questions about the population that should be studied further, and aid teachers and administrators in thinking about their own practice under the Common Core.

Quantitative Results

Quantitative data for this study was collected by use of a new instrument, the Deaf Education Common Core Mathematics Pedagogy questionnaire. I surveyed a nationwide sample during April 2017 by means of the online platform SurveyMonkey and dissemination through emails to administrators in Deaf schools in Common Core states. There were 60 respondents who answered beyond the Demographics section, the criteria for keeping survey data; three of the 60 respondents did not complete the Methodology section. Any missing data were not replaced, as this study was exploratory and descriptive in nature rather than predictive. I admit that only having 60 respondents was not as high as the 95% confidence level numbers of between 222 and 292 respondents that I desired (as discussed in the methods chapter). However, keeping in mind that I estimated the population to be between 522 and 1,218 teachers, 60 respondents falls between 11.5% and 4.9% of the total population.

In this section, I discuss the sample demographics, review the results of the survey, and report on the analysis of the instrument's reliability.

Description of the Sample. As this study deals with Deaf Education, it is appropriate that I begin by discussing the Deaf-specific characteristics of this study. Of the 60 respondents, 12 (20%) identified as Deaf, 2 (3.3%) as Hard-of-hearing, and 46 (76.7%) as hearing. This was a little lower than the 33.3% found by Suggs (2007), the most recent analysis of Deaf v. Hearing staff numbers. Previous studies, such as Andrews and Jordan (1993) were lower at 15.5% or roughly similar with Redding (1997). However, it must be considered that many of these studies focused only on schools that use signing (ASL/English or Total Communication schools) and often excluded non-signing schools (Listening & Spoken Language). Therefore, in a study like this one where both groups of schools were included, the real percentage is most likely closer to

what I saw in this sample. As for kinds of schools in this study, the majority of respondents (43) taught at schools where they identified the communication philosophy as ASL/English (71.7%), while 9 (15%) identified as Total Communication, and 7 (11.7%) identified as Listening and Spoken Language. This was in line with what I saw on the schools' websites when I disseminated the survey, based on information provided by Gallaudet University (American Annals of the Deaf, 2016a). It is important to keep in mind that many Listening and Spoken Language programs are housed within mainstream programs, which were excluded from this study (see Chapter 3 for rationale), and so the lower proportions make sense in this context.

Initially, I was not sure that gender was a characteristic I wanted to measure due to the potential for identification of male teachers and later wondered if it would make a large impact on the study. During my proposal phase, my committee suggested that I go ahead and collect the data, especially as there is research suggesting that gender does have an impact on student achievement (Acker, 1995; Dee, 2007; Martin & Marsh, 2005; Thomas, 2006). All but one of the respondents gave their gender, although one respondent with 30 years of experience gave their answer as, "Female and why does that matter how I teach math?" Fifty-five of the respondents (91.7%) identified as female and only 4 (6.7%) identified as male, with two female respondents specifically identifying as "cisgender female." This is a much lower male ratio than the 1993 study by Andrews and Jordan, which had a 21.6% to 78.4% male to female split. Looking at education in general, there also would be expected a 24% to 76% male to female split (National Center for Educational Statistics, 2017). This discrepancy may be due to the delimitations in this study. In my personal experience, I have seen zero to one male teachers working at Deaf residential schools as elementary teachers, although males may be working in capacities such as administrators, counselors, ASL specialists, audiologists, or other non-direct teachers.

In looking at the grades being taught, I did not expect that participants would teach more than one grade. However, over 40% of respondents (n = 24) taught two or more grades, with one participant in the Midwest teaching math to all grades K-6 (7 grades). Figure 5 shows the percentage of respondents who teach multiple grades. Deaf schools tend to be smaller schools with less than 200 students at nearly all Deaf schools (Efron, 2011), which would suggest that teachers may have multiple roles to support students. Another suggestion could be that Deaf schools use ability grouping rather than age grouping for teaching students who are historically behind in mathematics (Kritzer, 2009; Pagliaro & Kritzer, 2010). A third possible suggestion is that Deaf schools utilize a math specialist for teaching multiple grades rather than each teacher being responsible for mathematics.

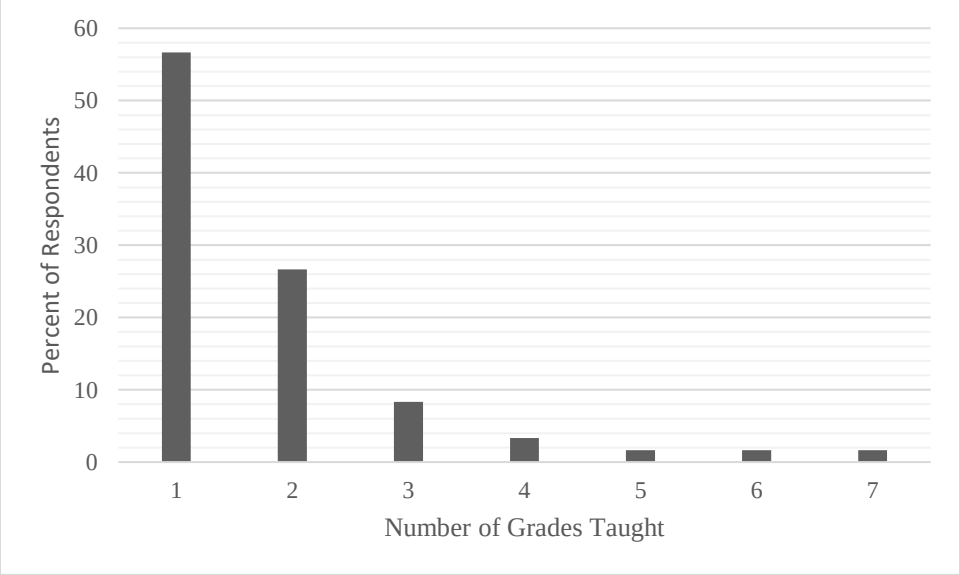

Figure 5. Percentages of respondents who teach multiple grade levels

There was great variety in the amount of time that participants have been teachers, ranging from nine teachers in their first year to one teacher in their thirty-sixth year. The average years of experience was 10.6 years (n = 59, S.D. = 8.8). National statistics show that 21.3% of teachers have 5 or fewer years of experience and 78.7% have more than 5 years. This study

skews slightly towards less years of experience with 35.7% (21) participants having 5 or fewer years of experience and 64.3% (38) with more than five years of experience. There is little literature to suggest why this may be the case, although Luckner and Hanks (2003) conducted a study that shows that educators of the D/HH have high levels of job satisfaction (91% of their sample), but there is still a high degree of attrition and turnover in Deaf schools despite this high level of satisfaction.

Looking at teacher degrees, in education as a whole, 39.9% of teachers have a Bachelor's degree, 47.7% have a Master's degree, and 8.7% have a degree higher than Master's (National Center for Educational Statistics, 2017). In this study, 25% (n = 15) of respondents have a Bachelor's degree, 71.7% (n = 43) have a Master's degree, and 3.4% (n = 2) have a degree above Master's, which are noticeably higher than the national averages for education in general, although it aligns with studies of teachers of the D/HH (Luckner & Hanks, 2003). This may be due to the fact that 75% (n = 45) of undergraduate degrees of the participants are not in Deaf Education while 61.7% (n = 37) of graduate degrees of the participants are in Deaf Education with 18.3% (n = 22) in education fields, suggesting that most of the teachers went back to school to get a Deaf Education degree or at least an education degree to be able to work in Deaf schools. It is important to note that six of the respondents (10%) had an undergraduate degree in Communicative Disorders and/or Speech, which are Deaf Education related, although not educational degrees. Table 6 displays the Bachelor's and Master's degrees of participants. Looking at cross-tabs of hearing status with level of degree and degree area shows no apparent relationship between if a person is Deaf or hearing and the type of degree they have.

Table 6

Bachelor's and Master's Degrees of Survey Participants

Degree Area	Bachelor's (n=54)	Master's (n=49)
Deaf Education	25% (15)	61.7% (37)
Education	26.7% (16)	5% (3)
Special Education	13.3% (8)	13.3% (8)
Non-Education	18.3% (11)	1.7% (1)
Non-Education Communicative Disorders and/or Speech	10% (6)	0% (0)

As can be seen in Figure 6, the distribution of participants across the United States in the four regions defined by Gallaudet University is similar, although there are more participants from the East and Midwest regions. This, however, fits the more concentrated distribution of Deaf schools in the Midwest and especially in the East (American Annals of the Deaf, 2016a).

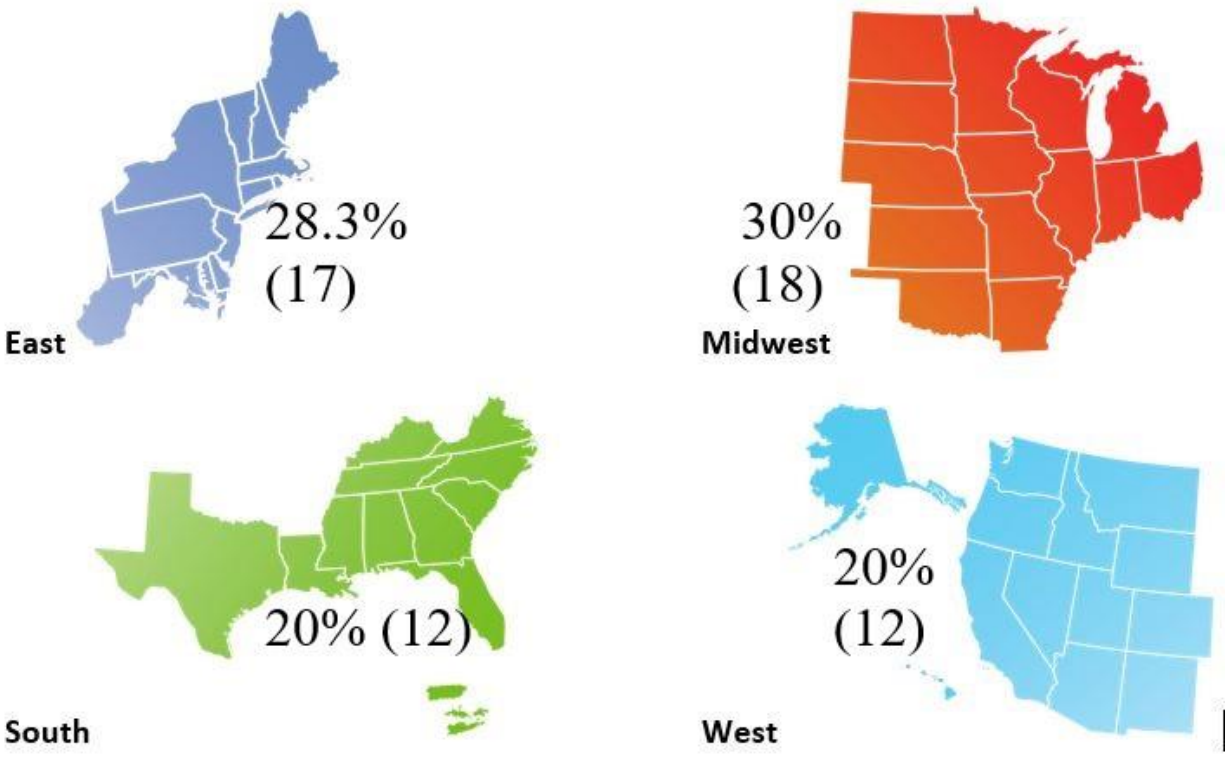

Figure 6. Distribution of participants across the four Gallaudet University regions.

The trainings in mathematics for the respondents showed that most (66.7%, 40) had formal education in mathematics and that pattern follows when the sample is broken down by region, hearing status, or school communication philosophy. In-school professional development in mathematics was nearly 50-50, and Listening and Spoken Language schools showed a tendency towards not having in-school professional development in mathematics (71.4%, 5). Out-of-school professional development for mathematics was generally not something teachers participated in, although the South region had more teachers participate than not. Finally, self-study in mathematics was about 50-50 across all teachers, regions, and schools.

The number of trainings in the Common Core State Standards (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010c, 2010d) and the expectations of the Common Core were less than trainings in mathematics. Across all types of training, the majority of respondents have not had trainings for the Common Core of any

of the four types asked about. This is true across regions and school communication philosophies, however, Deaf teachers were the only group to have more teachers do self-study about the Common Core than not (66.7%, 8).

Instrument Reliability Analysis. For the purposes of this study, there was no existing survey instrument that I could use. There were survey instruments regarding the implementation of the Common Core, teacher attitudes towards implementation of the Common Core, and Deaf Education. However, none of these existing instruments specifically addressed the intersection of teacher pedagogy, Deaf Education, and already implemented Common Core impact. Thus, as I discussed in the instrumentation section in Chapter 3, I used existing instruments as guides to create a new instrument – the Deaf Education Common Core Mathematics Pedagogy questionnaire. As this is a new instrument, it needs to be examined as to its validity and reliability. I addressed validity in the design phase and feedback phase of the instrument's creation, and discussions of validity can be found in Chapter 3. Here I am discussing reliability.

The instrument contains three sections: demographics, beliefs about teaching and the Common Core (philosophy), and methodology used in teaching and teaching the Common Core (methodology). I first estimated Cronbach's alpha reliability coefficient (Vogt, 2007) for the set of items related to philosophy and then for the set of items in the methodology sections to establish a baseline for each section as a whole. The estimates were .779 and .764, respectively. A few questions popped out as possibly needing recoding and the estimated Cronbach's alpha for the final section of the methodology was higher when these items were deleted (a desirable outcome). I discuss these items in more depth in this section.

The philosophy section had four sub-sections, which were clearly separated in the survey instrument (see Appendix A): beliefs about teaching in general, beliefs about teaching

mathematics, beliefs about Common Core, and beliefs about Common Core in Deaf Education. The reliability analysis for beliefs about teaching in general resulted in an initial estimate of .508 and identified one question as possibly needing to be reserve coded, "I feel stressed about teaching." This raised the alpha to .606; however, this also raised questions about if the stress question, even recoded, should be included. By removing it, the estimated alpha rose to .657, an improvement, but still below the acceptable level of .7 (Muijs, 2011, pp. 63-34). Although stress does have an impact on teaching (Luckner & Hanks, 2003; Skaalvik & Skaalvik, 2016), a teacher may be stressed but still enjoy their work, thus, stress does not necessarily connect with the other questions of this sub-section and I feel that it can be removed from section analysis.

However, it then became more evident that the question "I would rather teach Deaf/Hard-of-hearing students than hearing students" was affecting the section's reliability estimate. This intuitively makes sense, as the main intent of the sub-section is teaching satisfaction and this question does not necessarily reflect attitudes towards teaching, just a particular sub-group. Removal of this item from the group led to a rise in the estimated alpha to .721.

The next sub-section, beliefs about teaching mathematics, had an initial estimate for Cronbach's alpha of .647. I noted that two questions, "Deaf/hard-of-hearing students do well in mathematics" and "My textbook is a good resource for teaching mathematics" did not align, as they are questions that do not require teacher's assessment of her own practice. Upon their removal from the set of items in this sub-section, the estimate of Cronbach's alpha improved to .755.

The third sub-section, beliefs about Common Core, had an initial estimate for Cronbach's alpha of .753. I identified three questions that needed to be addressed. The first question was "The Common Core makes teaching mathematics more stressful" and, for reasoning similar to

the other stress question in a previous sub-section, I chose to just eliminate it from analysis for reasons previously discussed. Two other questions, “If given the choice, I would eliminate the Common Core” and “The Common Core limits my flexibility as a teacher,” were both written in negative tones as compared to the other questions. After reverse coding, I estimated Cronbach’s alpha again and the result was .878.

For the fourth sub-section, beliefs about the Common Core and Deaf Education, the estimated alpha had a value of .802 and only showed issue with one question, “I use the Common Core in my math teaching.” Looking at that question, it seems to fit more with the previous section than the section intersecting Deaf Education and the Common Core. I moved it to the previous section, beliefs about the Common Core, and it raised the estimated alpha of that section to .883 and the fourth section, beliefs about the Common Core and Deaf Education, then had an estimated alpha of .841.With these adjustments, the estimated of Cronbach’s alpha reliability coefficient rose from .802 to .880.

The methodology section has four subsections: amount of time, general teaching, Common Core teaching, and standardized testing. These were delineated in the instrument (see Appendix A). The amount of time sub-section contains listing by teachers of the approximate amount of time they spend on different educational activities; this does not require a reliability analysis. The general teaching subsection was, by far, the weakest sub-section with an estimated Cronbach’s alpha of .427. I identified one question, “deal with behavior issues instead of teaching,” that needed to be reverse coded. With that recoding, the Alpha improved to .462, but did not increase to an acceptable level, indicating that these results are not reliable for this sample.

The next subsection, Common Core teaching, had an estimated alpha of .844 and the "alpha if item deleted" analysis did not suggest the removal of any items from the analysis.

The last subsection, standardized testing, had an Alpha value of .576, however, on further reflection, each of the questions fits within the discussion of standardized testing but the questions themselves refer to slightly different aspects of standardized testing. After making these alterations, the final estimate of Cronbach's alpha for the methodology section is .771.

Table 7 shows the final estimate of Cronbach's alpha for each section and subsection along with recoding and removal information. Note that these reliability estimates are for this specific sample of teachers from this survey. Re-administrations of the instrument using different sample sizes or demographics may result in different findings. The final codebook for the dataset is in Appendix D.

Table 7

Estimates of Cronbach's Alpha Reliability Coefficient for the Sections and Sub-Sections of the Instrument with Information about Changes in the Items

Section	Cronbach's Alpha	Items Recoded	Items Removed
Philosophy	.880		
Beliefs about teaching in general	.721		2
Beliefs about teaching mathematics	.755		2
Beliefs about Common Core	.878		1
Beliefs about Common Core and Deaf Education	.841	2	
Methodology	.771		
General teaching	.462	1	
Common Core teaching	.844		
Standardized testing	N/A (.576)		3

Note. Standardized testing was removed from the final instrument and thus shows N/A for its influence on instrument totals and sub-sections. The original Cronbach's Alpha for that section is listed in parentheses.

Description of Results. The survey was sent to teachers of the D/HH working in Common Core states. Being in a Common Core state, however, does not ensure that a Deaf school actively uses the Common Core. Overall, 75% (45) of teachers work at schools that follow the Common Core closely or very closely and 21.7% (13) work at schools that follow the Common Core partially. Only two teachers responded that their schools follow the Common Core not closely or not at all; one was from the Midwest and worked at an ASL/English school and one worked in the South

and worked at a Listening and Spoken Language school. Looking at the relationship between following the Common Core and region or communication philosophy did not show any preference towards one region or one communication philosophy.

Over 80% of respondents (n = 48) gave a favorable view of teaching, which is in line with the most recent research into job satisfaction for teachers of the D/HH (Luckner & Hanks, 2003). I looked at hearing status, region of the country, and school communication philosophy and could find no identifiable difference in job satisfaction when subdividing the sample into those categories.

Two of the questions, "I would rather teach Deaf/Hard-of-hearing students than hearing students" and "Teaching Deaf/Hard-of-hearing students is rewarding," dealt directly with teachers' perceptions of working with D/HH students and these questions had a higher proportion of "strongly agree" than other questions about teacher satisfaction with only one teacher replying that they disagreed with those questions. This teacher was highly educated, rated themselves as an excellent signer, had degrees in Deaf Education and Education, and stated they had more than 15 years of experience in the field – one would assume that this would be a teacher who would feel rewarded in a profession in which they had spent such a great deal of time and education.

It is interesting to note that 61.7% (37) respondents stated that they agree or strongly agree that they feel stressed about teaching. McCarthy and Lambert (2006), in speaking of the stresses teachers face in our modern age of accountability, explain that "in a field highly regulated by state and federal law, special educators face a job that in many ways isolates them from much of the rest of the school community. The students they educate face academic challenges that make success, at least by the standards at which success is currently defined and

judged, a rarity. Reams of paperwork mandated by government agencies add to the already daunting task of educating students with disabilities. Special education is not an option for school districts, yet the job of a special educator is stressful, unique from that of other educators, and overburdened" (p. 199). However, they further note that the "notion that teaching is a calling in which the value of their work takes precedence over financial reward helps explain why many teachers stay in their profession despite the many demands of today's classroom. However, the notion of a calling means that teachers are at least partially motivated by their own internal standards and values about what it means to educate younger persons" (p. 224). In Chapter 2, I noted that Deaf Education appears to have a "salvation" mindset in working with D/HH children. This could help explain the high degree of stress in participants while still having a high degree of satisfaction in teaching and an even higher degree of satisfaction in working with D/HH students, as their teaching "calling" is to "save" and so their own internal set of standards and values that lead to coping with the stress and viewing their work favorably.

Confidence in mathematics was another factor in teaching that I looked at in this study. All respondents stated they felt they understand mathematics, although 5 (8.3%) stated that they do not enjoy teaching mathematics. When asked if mathematics was their favorite subject to teach, 10 (16.7%) strongly agreed, 19 (31.7%) agreed, while 26 (43.3%) disagreed, and 5 (8.3%) strongly disagreed. Participants were asked if they believed that D/HH students do well in mathematics; 7 (11.7%) strongly agreed, 35 (58.3%) agreed, 16 (26.7%) disagreed, and 2 (3.3%) strongly disagreed.

Teachers of the D/HH have, in general, more positive attitudes towards students with disabilities and their ability to achieve (Lampropoulou & Padeliadu, 1997) although the pervasive story of D/HH students only achieving at a 4th grade level may have an influence on

how teachers perceive their students (Dolman, 2013; Hrastinski & Wilbur, 2016; Mitchell, 2008; Pagliaro & Kritzer, 2013). However, in looking at teachers' attitudes towards teaching mathematics and their attitudes towards D/HH student achievement, there could be a possible connection between the two. Teachers' attitudes towards mathematics have an influence on how students achieve (Domino, 2009; Karp, 1991), although these studies were for hearing students in regular classrooms.

The focus of this study was the Common Core and the next section looks at how the participating teachers feel about the Common Core, both the standards and the initiative's expectations. Overall, respondents had a positive view of their own understanding of the Common Core, but they did not hold the same positive view towards the usefulness of the Common Core, as shown in Table 8.

Table 8

Comparison of Beliefs about the Common Core

Question	Strongly disagree	Disagree	Agree	Strongly agree
Beliefs about understanding the Common Core				
I understand the Common Core	0%	15% (9)	65% (39)	20% (12)
I understand the Standards for Mathematical Content	1.7% (1)	10% (6)	73.3% (44)	15% (9)
I understand the eight Mathematical Practices	3.3% (2)	28.3% (17)	63.3% (38)	5% (3)
Beliefs about the usefulness of the Common Core				
I enjoy teaching using the Common Core	6.7% (4)	53.3% (32)	33.3% (20)	6.7% (4)
The Common Core helps me teach better	6.7% (4)	46.7% (28)	38.3% (23)	8.3% (5)
The Common Core limits my flexibility as a teacher	3.3% (2)	26.7% (16)	50% (30)	20% (12)
If given a choice, I would eliminate the Common Core	6.7% (4)	40% (24)	35% (21)	16.7% (10)

From these responses, it seems that teachers have a general negative view about the Common Core, as it impacts their teaching. However, this does not mean that teachers want to remove the Common Core, necessarily, as the desire to eliminate the Common Core is split between agreement and disagreement. In looking at their textbooks, 53.4% (n = 32) of teachers often or almost always used a textbook that was labeled as “Common Core” and in general teachers felt that their textbooks align with the Common Core, although 30% (18) of teachers did

not feel their textbooks aligned. This is better than previous studies have shown (Polikoff, 2015; Tran, 2016), although the time table for adoption and improvement of textbooks may play a role in that, as well as the fact that Deaf schools tend to be smaller and so have a little more flexibility in the programs they can choose, as compared to larger districts.

Part of the reason for the negative impressions towards the Common Core could be the amount of training provided, as was discussed in the demographics of the survey. Teacher participants did not receive much training or preparation for the Common Core, although their perceptions of their understanding stand in potential conflict to singling out training for the reason for the negative perspectives. Research has shown, though, that lack of preparation for the Common Core has had a large influence on teacher perceptions and implementation of the Common Core (Brooks & Dietz, 2013; Burks et al., 2015; Debakcsy, 2015; Hartong, 2015; Henderson et al., 2015; Iannone, 2015; McNulty & Gloeckler, 2014; Polikoff et al., 2016; Sawchuk, 2012; Stern & Wood, 2014; Swars & Chestnutt, 2016). However, when asked specifically if the Common Core was important for elementary and secondary students, 50% stated agreement for elementary and secondary, separately. However, when asked if the Common Core should remain in Deaf schools, only 31.7% (19) teachers agreed, with only one of those strongly agreeing, and the remainder 68.3% disagreeing.

To this point in the discussion, I have examined respondents' beliefs about teaching, teaching mathematics, and teaching the Common Core. Teachers were also asked about their beliefs regarding D/HH students and the Common Core. Only one participant agreed that the Common Core was designed with the needs of D/HH students in mind. Of the remaining, and large majority, of respondents who disagreed, 28 (46.7%) *strongly* disagreed. One need identified was cognitive ability, and 41 (68.4%) of teacher participants stated that they disagreed

or strongly disagreed with their students having the cognitive ability to succeed with the Common Core. Another identified need was language ability, and all but four of the participants (56, 93.4%) disagreed or strongly disagreed that their students have the language ability to succeed with the Common Core. Looking from the opposite angle, when asked if the Common Core meets the language needs of D/HH students, 12 (20%) of participants agreed while the remainder (80%) disagreed. I delved more specifically into the meaning behind these results during the qualitative data collection for this study.

I developed a set of seven hypotheses related to the demographics of the sample and the beliefs measured in the instrument as displayed in Table 3 in Chapter III and here again in Table 9. These hypotheses came about as a result of the interplay of a review of the literature and my own lived experience as an educator of the D/HH in a Deaf school working with a variety of mathematics teachers since the formal adoption of the Common Core in the state of New Mexico. Several of my hypotheses proved to be accurate and some surprised me by not being accurate.

Table 9

Hypotheses of the Study Related to Demographic Questions

Lower elementary teachers have more negative perspectives of the Common Core.
Newer teachers are more accepting of the Common Core.
The hearing status of teachers influences their perceptions of the Common Core.
The sign language ability of teachers influences their success with the Common Core.
Different regions of the country have different perceptions of the Common Core.
Schools with more spoken English-based communication philosophies are more accepting of the Common Core.
Teachers with more training in mathematics and/or the Common Core are more accepting of the Common Core.

Hypothesis: Lower elementary teachers have more negative perspectives of the Common Core. Traditionally, lower elementary is defined as Kindergarten through 2nd grade and upper elementary is defined as 3rd grade to the end of elementary, 5th or 6th grade. Personal experience showed that the lower elementary teachers I knew had a harder time with the Common Core due to the increased rigor that was not seen in lower elementary, usually, prior to the Common Core. One of my colleagues told me in a private conversation that she was worried the first year with the Common Core because previous standards required learning numbers up to 20 while the Common Core requires kindergarten students to learn numbers up to 100 (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010d, p. 11).

Studies of the introduction of the Common Core showed general negativity by lower elementary teachers, although studies did not necessarily compare lower and upper elementary perspectives (Burks et al., 2015; Debakcsy, 2015; EPE Research Center, 2012; Sawchuk, 2012; Swars & Chestnutt, 2016; Underwood, 2015). I compared those teachers who taught lower and

upper elementary using a combined measure of beliefs about the Common Core, as discussed in the instrument results, and found that the means of each group were relatively similar, 15.12 (SD = 4.69) and 15.44 (SD = 4.81) total scores respectively. This surprised me as I expected a greater difference. However, the range of responses were lower for lower elementary, 2 to 22 total score, than for upper elementary, 7 to 28 total score. This was reflected in the skewness statistic with lower elementary -1.02 (SE = .456) compared to upper elementary .422 (SE = .414). This would suggest that in general, lower and upper elementary teachers in this study had similar feelings about the Common Core, although the lower elementary leans towards more negative opinions.

Hypothesis: Newer teachers are more accepting of the Common Core. Personal experience showed that teachers who were newer to the profession were more accepting of the Common Core. One difficulty, though, is in defining "newer." One way of defining "newer" is the traditional three-year timeframe for teacher mentoring and probation (see www.newteachercenter.org). Another way of defining "newer" would be those teachers who began their teaching in the 2010-2011 school year, after the June 2010 adoption of the Common Core (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2016a). For the sake of thoroughness, I investigated both definitions. For teachers who had taught three years or less at the end of the 2016-2017 school year, the average score for the combined measure of beliefs about the Common Core were similar to their more veteran counterparts, 14.67 (SD = 4.53) to 15.51 (SD = 5.33). The skew of the data show that newer teachers lean towards more positive views, 1.084 (SE = .580), while more veteran teachers lean slightly towards more negative views, -.764 (SE = .361). Looking at those who started teaching since the introduction of the Common Core in the 2010-2011 school year, the difference between the means was even smaller, with teachers who began teaching since the introduction having an

average belief score of 15.19 (SD = 5.28) and those who began teaching before the Common Core having an average belief score of 15.39 (SD = 4.26). The skew statistics were also fairly close, with -.075 (SE = .448) and -.325 (SE = .421), respectively. It is interesting to note that the newer teachers had a greater range of perceptions of the Common Core, with total scores ranging from 2 to 28, while veteran teachers were a little less, total scores ranging from 5 to 23. Many factors could have influenced this. The Common Core was accepted in June 2010, but formal adoption by states took a few years to fully roll out (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2016a). Each state chose their own timeline for implementation with states having full implementation ranging from 2011 to 2015 (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2016b), which may have created variations in state, school, and teacher preparation program use and implementation of the Common Core in their programs, changing teacher exposure, experience, and use of the Common Core State Standards. Furthermore, the Common Core has been a hotly discussed and debated concept since its inception (Stern & Wood, 2014), giving teachers and pre-service teachers potential years of positive or negative exposure to the Common Core before they actually began to use the standards or feel the influence of the initiative.

Hypothesis: The hearing status of teachers influences their perceptions of the Common Core. Teachers who identify as culturally Deaf have a generally negative perspective towards what they view as unknowledgeable and potentially oppressive outside influence on Deaf Education (Cleve, 1993; Gallegos, 2016; Lane et al., 1996; Levesque, 1990; National Association of the Deaf, 2016; Suggs, 2007). As discussed in the review of the literature, Deaf schools, as historic asylums, find resentment in panopticon style intrusion on their unique asylums and sanctuaries

(Baynton, 1993; Berthier & Henry, 2009; Best, 1914; Cleve, 1993; Foucault, 1984). However, the participants in this sample showed a different story. Deaf teachers had an average total belief about the Common Core score of 17.82 (SD = 4.64), the two Hard-of-hearing teachers had an average score of 18 (SD = 4.24), and the hearing teachers, who have a 4:1 ratio with the Deaf teachers, have an average belief score of 14.56 (SD = 4.59). Deaf teachers' responses showed a skew of .969 (SE = .661) while hearing teachers' responses showed a skew of -.436 (SE= .354). While not a dramatic difference, it does show that Deaf teachers in this sample had a more positive view of the Common Core. This may be partially due to Deaf teachers have, in general, higher expectations for their students than hearing teachers (Lampropoulou & Padeliadu, 1997; Shantie & Hoffmeister, 2000).

Hypothesis: The sign language ability of teachers influences their success with the Common Core. For this hypothesis, I need to first define what is meant by "success." The difficulty, however, is that we cannot just use a single dictionary definition for success with the Common Core. Researchers, policy makers, and educators on both sides of support for the Common Core use subtly varying definitions of success under the Common Core (Burris et al., 2016; Heitin, 2016; Henderson et al., 2015; Lee, 2011; Loveless, 2013; Peterson, Barrows, & Gift, 2016; Polikoff et al., 2016; Stern & Wood, 2014; Tucker, 2016). Even lay writings argue back and forth over the definition of success for the Common Core (see https://www.quora.com/Is-Common-Core-successful) for an example of educator discussion about defining success for the Common Core). Keeping in mind the broad definitions of "success" under the Common Core, I will look at two definitions: success means that teachers hold a positive belief towards the Common Core, meaning they use the Common Core in a positive manner to its maximum benefit; and success means that the teachers perceive their students are successful under the

Common Core. This hypothesis viewed success as a factor of sign language skill. In programs that use sign-based communication for educating D/HH students, the ability to sign is connected to student's academic and emotional success, both for the student and the teacher (Calderon & Greenberg, 2003; Terezinha Nunes, Pretzlik, & Olsson, 2001; Padden & Ramsey, 2000).

Beginning with success defined by educator beliefs, there does appear to be a connection, although not the one I hypothesized. Teachers with little to no ASL have a total belief score higher than those with greater levels of ASL skill (average total score of 20). Those participants who reported an "Intermediate" level of ASL skill had the lowest total beliefs score, 13.44 (SD = 3.81). Those who reported a level of ASL as "Advanced" were the next lowest belief score (15.10, SD = 4.86), although they had the greatest range of scores from a low of 2 to a high of 22. Those who had a "Superior" self-reported ASL level, often referred to as native-like fluency, had a fairly high total belief score of 18.57 (SD = 5.59) and had much less variability in scores compared to the previous two proficiency levels.

I analyzed the second definition of success, student achievement as perceived by teachers, by using a composite variable of the six questions from the survey that related to student achievement, rather than teacher perception. There is relatively no difference between the perception of student success across groups of ASL skill levels. All scores are fairly low and fairly close, implying teachers do not perceive their students as successful in mathematics under the Common Core. The lowest total success perception score is 6.33 (SD = 1.53) from the non-users of ASL and the highest total success perception score is 9.50 (SD = .71) from the "survival" users of ASL. All other groups fall within this range, closer to the high range than the low range.

Both definitions of success yielded slightly different results, but the general picture is that the hypothesis that ASL skill impacts success with the Common Core is not true, at least for this sample. The first definition of success, teacher beliefs in the Common Core, appears to follow Deaf/hearing lines more than actual ASL skill level, assuming D/HH teachers have higher signing skill level than their hearing counterparts. The second definition of success, teacher perception of student achievement, did not show any perceivable pattern for the highs and lows and the general scores were close together, suggesting that there was no inherent difference in teachers based on their signing skill. Of course, it must be noted that all signing levels were self-reported by participants and may not reflect their true sign level, as people tend to over-judge their abilities (Campbell, Dollaghan, Needleman, & Janosky, 1997; Donaldson & Grant-Vallone, 2002) via a phenomenon known as the Dunning-Kruger effect (Kruger & Dunning, 1999), which may have impacted the nuance in the analysis. Further research into the impact of ASL skill on student achievement under the Common Core is needed.

Hypothesis: Different regions of the country have different perceptions of the Common Core.

The United States is a diverse country and contains several regions that, although part of a continuous whole, have both subtle and profound cultural differences (Arbesman, 2012). In education, these differences are sometimes more pronounced, especially when considering the unique minority groups that help define each region (Obidah & Teel, 2001). As was mentioned in the instrument design discussion in Chapter III, Deaf schools tend to think of themselves in terms of where they belong in the Gallaudet University Regions (Gallaudet University, 2015), and each region often has a similar identity in their cultural, linguistic, and educational style. Table 10 shows the results by region. I would have expected the regions to be similar, but the data show a different picture. The West and Midwest are more accepting of the Common Core

than the East and the South, although the Midwest had the lower minimum and a stronger skew towards negative perceptions of the Common Core. The South shows the lowest total Common Core beliefs score that I saw from any of the hypotheses, even with a slight skew towards positive perceptions of the Common Core and a slightly higher minimum score. These interesting findings were explored further in the qualitative interview portion of the study.

Table 10

Total Belief Score about the Common Core by Gallaudet University Region

Region	Mean (Standard Deviation)	Minimum	Maximum	Skewness (Standard Error)
East (n=15)	15.07 (4.37)	5	22	-.402 (.580)
Midwest (n=18)	16.33 (5.02)	2	23	-1.494 (.536)
South (n=12)	12.58 (4.17)	7	22	1.069 (.637)
West (n=12)	16.33 (4.68)	10	28	1.327 (.637)

Hypothesis: Schools with more spoken English-based communication philosophies are more accepting of the Common Core. As I discussed in the review of the literature, language is the central issue in Deaf education (Baynton, 1993; Hult & Compton, 2012; Veditz, 1913) and the debate over the role of signed versus oral communication hotly continues to this day (Smith & Wolfe, 2016). My hypothesis was that schools that employed a more spoken English or signed English philosophy would be more accepting of the Common Core than those schools who use an ASL philosophy, due to bilingual education concerns about the Common Core shared with all English as a Second Language program concerns (Saulsburry, 2014). I looked at the three major communication philosophies currently in use: ASL/English, Total Communication, and Listening and Spoken Language LSL). ASL/English respondents had an average combined belief

score about the Common Core of 15.24 (SD=5.12, n=41), Total Communication had the lowest with an average of 14.00 (SD=4.06, n=9), and LSL respondents had the highest total average of 17.00 (SD=2.89, n=7). This appears to validate my hypothesis, at least based on this sample, but it appears to be in conflict with the previous hypothesis that the hearing status of teachers influences their perceptions of the Common Core. The data showed that Deaf teachers had a higher opinion of the Common Core than their hearing counterparts. It would seem, then, that the reason ASL/English teachers are more negative towards the Common Core is due to the hearing teachers rather than the Deaf teachers, an interesting state of affairs. Further, Total Communication uses a combination of sign language and spoken English (Vasishta & Tompkins, 2001) and, based on prior experiences and pilot studies I would have expected Total Communication to have a perception more in line with the LSL, but this group had the lowest perception of the Common Core. This is an area that requires more exploration.

Hypothesis: Teachers with more training in mathematics and/or the Common Core are more accepting of the Common Core. When the Common Core was introduced to US teachers, there was not a great deal of professional development offered to train teachers in its use, changes, and nuances (Burks et al., 2015; Iannone, 2015; Sawchuk, 2012; Swars & Chestnutt, 2016; Underwood, 2015). Thus, I theorized that the more training a teacher had with the Common Core the greater the possibility they would hold positive perceptions of the Common Core. Also, as a former mathematics teacher myself, I saw that those teachers who had a strong mathematics background were more understanding of the Common Core State Standards and, often, had already implemented many of the Common Core Initiative ways of teaching. In general, this sample appears to follow my hypothesis, as shown in Table 11. The sharpest increase was seen when teachers engaged in multiple types of Common Core trainings. For mathematics trainings,

when teachers had no or only a single type of training, they had more negative perspectives on the Common Core; but if they had two, three, or four types of training, their perspectives on the Common Core did not alter much.

Table 11

Mathematics or Common Core Training Types and Total Score on Common Core Beliefs Where a Higher Score Indicates a more Positive Set of Beliefs

	Total Types of Training Experienced				
Training Type	0	1	2	3	4
Mathematics Trainings	14.67 (n = 3, SD = 5.5)	12.67 (n = 15, SD = 4.3)	16.10 (n = 20, SD = 4.3)	16.71 (n = 14, SD = 4.0)	16.17 (n = 6, SD = 7.0)
Common Core Trainings	12.20 (n = 15, SD = 4.1)	15.22 (n = 23, SD = 3.8)	17.31 (n = 16, SD = 4.7)	None	19.25 (n = 4, SD = 6.1)

Note: Training types include formal education (such as college courses), in-school professional development, out-of-school professional development, and self-study.

The third major section of the survey was the methodology teachers of the D/HH employ, especially when considering the expectations of the Common Core. Respondents were asked to quantify the amount of time they spend teaching mathematics, as well as how much of that time uses a textbook and uses the Common Core. Table 12 shows the amount of time spent, and it appears that most participant teachers teach mathematics five days each week with a little under two hours each day (1.48 hours), slightly more than the national average of 1.19 hours (National Center for Educational Statistics, 2017), giving these students in these Deaf schools approximately 7.1 hours of mathematics instruction weekly. What is interesting, however, is that the number of days that participants considered themselves using the Common Core is, on average, one day less per week.

Table 12

Time Spent During a Typical School Week Teaching Mathematics

Activity (n = 56)	Average Hours per Week	Minimum Hours per Week	Maximum Hours per Week
How many days a week do you teach mathematics?	4.80 (SD = .77)	0	5
How many hours do you teach mathematics each of those days?	1.48 (SD = 1.20)	0	6
How many of those days do you use a textbook to guide your instruction?	2.98 (SD = 1.92)	0	5
How many of those days do you consider that you are using the Common Core?	3.85 (SD = 1.54)	0	5

The teachers in this survey were also asked to quantify the types of activities they use for mathematics instruction during a typical week of teaching, as shown in Table 13. There is no set pattern for how the respondents used their time to teach mathematics, as the minimums and maximums fluctuate wildly and there is a great amount of variance in each area, as evidenced by the standard deviation. Using the averages from Table 13 and the averages from this section, the approximate hours spent on each methodological area are: direct instruction 2.4 hours, hands-on learning 2.2 hours, homework/practice assignments 1.3 hours, classroom assessment 0.7 hours (42 minutes), standardized test practice/tests 0.3 hours (18 minutes), and other 0.3 hours (18 minutes).

Table 13

Percentage of Time Teachers Use Various Mathematics Instruction Activities in a Typical Week

Activity	Average Percentage of Time per Week	Minimum Percentage of Time per Week	Maximum Percentage of Time per Week
Direct Instruction	33.95% (SD = 13.25)	10%	75%
Hands-on Learning	31.50% (SD = 15.27)	5%	75%
Homework/Practice Assignments	17.89% (SD = 12.03)	0%	50%
Classroom Assessment (tests, quizzes, etc.)	9.68% (SD = 6.79)	0%	25%
Standardized Test Practice/Standardized Tests	3.63% (SD = 5.43)	0%	30%
Other	3.75% (SD = 11.55)	0%	75%

Note: Due to rounding and averaging, percentages may not add to 100%.

Speaking to Common Core practices in their teaching and planning, a little more than half of respondents (51.6%, n = 31) planned lessons with the Common Core in mind often or almost always. A slightly higher percentage (56.7%, n = 34) planned units with the Common Core in mind often or almost always. This suggests that the Common Core State Standards, as the standards of instruction in the states of this study, are being utilized in the classroom, although this does not address the pedagogical practices envisioned by the Common Core *Initiative*. Addressing the larger pedagogical aims of the Common Core are the eight Mathematical Practices listed in the mathematics standards (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010d, 2010i), a set of eight ways of thinking and acting mathematically that are meant for students to shift to more rigorous, critical, and deep thinking while doing mathematics (Brenneman, 2016; Debakcsy, 2015;

McNulty & Gloeckler, 2014; Schmidt & Burroughs, 2013; Swars & Chestnutt, 2016). Only 28.3% (17) of teachers in the survey stated they used the Mathematical Practices in their lessons while 35% (21) stated that they did sometimes, which although they are part of the Common Core State Standards, is a much lower rate than how many teachers used the Common Core in their lessons. A slightly higher percentage (38.3%) representing 23 teachers stated that they purposefully connect the Mathematical Practices to the mathematical content of their lessons with 26.7% (16) of the teachers saying they did that sometimes. This would suggest that the Mathematical Practices are being used more passively while teaching, rather than being an explicit part of the instructional process (Sarah Kate, 2016; Sengupta-Irving & Enyedy, 2014). This raises challenges as true mathematical practices are, as described by Moschkovich (2013), "sociocultural phenomena in the sense that they are higher order intellectual activities that originate through social interaction. Children and adolescents learn to participate in mathematical practices first interpersonally and then come to appropriate the practices as these become part of the repertoire of practices that an individual will later use (either alone or in the company of others)" (p. 270). This suggests that active interactions and structures to share thinking are essential to developing mathematical practices, especially when one considers the language needs of D/HH students in developing mathematical thinking (R. R. Kelly et al., 2003; Kritzer, 2009; Pagliaro, 1998; Pagliaro & Kritzer, 2013).

One of the more interesting questions was whether or not teachers were able to teach all the Common Core State Standards by the end of the school year. In the "almost always" category were 11.7% of teachers (7), 20% of teachers (12) were in the "often" category, "sometimes" was the highest at 26.7% (16), "seldom" was 15% (9), and 20% of teachers (12) stated that they never are able to teach all the standards by the end of the year. This is disturbing that more than half

(61.7%, n = 37) of the participants in this survey felt that they cannot regularly complete the expectations of the Common Core standards during their year.

A final teaching practice I examined in this study was preparation for standardized testing, an unintended aspect of the Common Core that came along with the implementation of the standards (Bestor, 2016; Brenneman, 2016; Debakcsy, 2015; Polikoff et al., 2016; Shanahan, 2015; Tucker, 2016). Respondents to the survey showed varying levels of test preparation activities with 21.6% (13) of responding teachers having activities and/or lessons that focused on testing preparation often or almost always, 38.3% (23) of respondents had those lessons sometimes. The teachers reported that 75% (45) had classrooms where the students received accommodations for standardized testing. Even with accommodations, however, 48.3% (29) of participants stated that their students seldom or never passed standardized tests and an additional 35% (21) participants only had students pass "sometimes." This appears to align with the concerns about standardized testing for D/HH students and their achievement (Mitchell, 2008; Qi & Mitchell, 2012; Traxler, 2000), which is troublesome considering the role of high stakes testing in student and educator measurement in today's educational system (Bestor, 2016; Henderson et al., 2015; National Governors Association et al., 2008; Stern & Wood, 2014).

Qualitative Results

Qualitative data for this study was collected in two ways: comments made by respondents during the survey in the quantitative phase and interviews with eight volunteers chosen from the survey respondents. Creswell (2015) recommended four to eight interviews for this type of mixed methods research. I had originally envisioned four interviews, but as there were fewer survey respondents than I had hoped, I felt that the full eight interviews would aid in ensuring that this study would be data rich to provide meaningful results and validity.

In this section, I discuss the interview sample demographics and share key themes from the data analysis.

Description of the Sample. The sample for this phase of research was drawn from the sample of the quantitative phase. At the end of the survey, participants were asked if they would be willing to participate in a follow-up interview about the topics of the study. They indicated their interest via a separate instrument that was linked from the survey instrument. A spreadsheet of the interested parties was generated, and a column of random numbers was added using the random number feature of Microsoft Excel. The spreadsheet was then sorted by region of the country and then by random number. I selected the first two participants from each of the four regions, creating the stratified random sampling for the interviews. I then contacted the potential interview candidates and asked if they were interested and gave them a copy of the informed consent document (see Appendix B for the interviews). Seven of the eight candidates expressed interest. I contacted the third person on the "South" region list and invited that person to participate and she agreed.

The interview participants were all female teachers with varied numbers of years of experience. Table 14 presents the information I collected about the participants, as well as the pseudonym used in analysis and reporting.

Table 14

Characteristics of the Qualitative Interview Participants

Interview	Pseudonym	Hearing Status	Region	Setting	Grade(s) Taught
A	Alice	Hearing	West	ASL/English Residential	Lower Elementary
B	Bria	Deaf	West	ASL/English Residential	Lower Elementary
C	Cindy	Deaf	East	ASL/English Day School	Lower & Upper Elementary
D	Diana	Hearing	Midwest	Listening & Spoken Language Residential	Lower & Upper Elementary
E	Elizabeth	Hearing	South	ASL/English Residential	Upper Elementary
F	Faith	Hearing	East	ASL/English Residential	Upper Elementary
G	Gina	Hearing	Midwest	Total Communication Residential	Upper Elementary
H	Heather	Deaf	South	ASL/English Day School	Upper Elementary

Note. "Lower elementary" refers to grades K-2, "Upper elementary" refers to grades 3-5 (possibly 6). "Residential" typically refers to Deaf schools that have dormitories for students in addition to daily commuter students. "Day school" typically refers to Deaf schools that do not have dormitories and only serve daily commuter students.

Description of Results. After coding the data, I analyzed the codes to create themes and using these themes I created groupings that are the key concepts drawn from this phase of the study (Creswell, 2014; Miles et al., 2014). The research lens used to understand participants'

experiences relied on phenomenology, thus the themes and key concepts drawn from the participants' comments and interviews should be viewed as teachers' perceptions of the phenomenon of the Common Core as it has influenced Deaf Education and the teachers' own pedagogy. At a basic level, there is a tension in teachers' perceptions of the Common Core that is both positive and negative. I would describe this as a type of cognitive dissonance that is best summed up by Alice who stated in her interview that for the Common Core "I would say the strength is that it works for some kids and the weakness is it absolutely fails for others."

During the interviews, the first question I asked participants was, "To you, what is the Common Core?" (see Appendix C). All participants gave very similar answers, which was interesting as they represented a broad swath of the country, two types of communication philosophies, Deaf and hearing, and different types of Deaf schools. The most typical response was given by Bria, who said "The Common Core is a set of guidelines to meet student needs for learning." In all the responses, the word "guidelines" appeared most often. This is reminiscent of the Common Core's own statement that the standards only tell teachers what to teach instead of how to teach (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010c, 2010d, 2010e, 2010h, 2010i). There is an implication in the word guideline that the teachers feel they have some say in how they teach, however all the interview participants and several of the survey participants mentioned the limitations and inflexibility of the Common Core in their teaching, a seeming contradiction. There was also a sense of the impact of the new rigor and approaches advocated by the Common Core, as stated by Elizabeth, "The Common Core is a new perspective on math… it's not black and white anymore, there's more ways and more strategies and more ways to get to the problem."

Many of the participants also explained that the Common Core grants a sense of commonality across states and schools and that, as Cindy noted, it is "nice to know that the expectations are there for *all* students in America without regard to the variations between students."

Several key themes from the experiences of participants related to the Common Core in a general sense. Looking towards negative aspects of the Common Core first, Alice shared her frustration that "It feels like there's just so much more to cover, so many more specific things. Like the way that my standards were set before they could bring more easily math into other areas so we could do math in science and social studies and now it feels like we have to do math as a separate thing." She continued speaking of the authenticity of her teaching mathematics, and feeling that there was a disconnect between expectations of the standards and teaching in ways that connected with students:

> I feel it's a little more forced in what I want to teach. I can see things that make sense, yes, you have to know this. As much as I can I apply to them, this is why you need to learn this. There are certain things in the Common Core I feel like are applicable to their lives and they're kindergarten, they're 5, so most of the time I can find something that's applicable but other times I'm like, 'ahhh, you need to know this so you can go to 1st grade.' It doesn't feel as interesting to them at that point, because it feels like I'm dumping this on them.

In addition to the applicability of the standards, other teachers spoke of the inaccessibility of the standards, which contributed to feeling that in their teaching they had become "forced" to use the standards without fully accepting or understanding them. Diana said, "I didn't feel it was very clear and because I want to be a good teacher, it made me think more about what I was

teaching in that capacity having to really research and understand what I was supposed to do because I felt that I couldn't just glance at it, it didn't just come to me easily." In the same vein, a teacher from the East with 30 years of experience said that the standards "are written for math majors, the average student/teacher would have a hard time breaking them apart and teaching each part." These feelings have been reflected in writings about the Common Core, both research-based (Brenneman, 2016; Burks et al., 2015; Khaliqi, 2016; McNulty & Gloeckler, 2014) and opinion pieces (Debakcsy, 2015; Stern & Wood, 2014; Tucker, 2016).

Teachers were not the only adults who felt the standards were inaccessible. Several teachers commented that parents were not able to help their students with homework because they did not understand the approaches or expectations from the Common Core. For example, Diana commented:

> I would see all these things online that are like 'this is what you give parents to tell them what you're doing in math because you can't give the parents the standards they're too complicated' and I thought that's such a big disconnect, if you think it's too hard to explain to parents, especially for me at the elementary age, if it's too hard to explain to parents then it's probably too hard for me to grasp as a teacher.

A teacher from the South who works at an ASL/English program said bluntly, "Common core math makes it more difficult for parents of my students to assist their children in homework." Perhaps this lack of accessibility contributes to why many parents are against the Common Core (Debakcsy, 2015; Henderson et al., 2015; Pascopella, 2016). Faith spoke of the roll-out timeline used in her signing residential school in the eastern United States using an all-at-once approach to implementation that made it so her fourth grade class did not have the requisite skills for the Common Core and so "coming out of that, I think, had some things with it,

a negativity about the Common Core," which was also felt by parents. Diana had more to say about parent perceptions of the Common Core and noted a struggle faced from parents:

> We had a lot of parents, because there's so much bad PR around Common Core, we had parents who were like 'my kids can't do this Common Core math!' and we would try to explain to them that we weren't using 'Common Core math.' We are using these ideas to guide how we teach the kids, but there was a lot of resistance from parents when they found out we were doing Common Core. Some kids would go home to do homework and it was like, I feel awful saying it, but a trendy thing to do to say, 'we can't do this Common Core math,' so I felt like that impacted the students through their parents to put off their math.

These perceptions were partially extenuated by the textbooks used by the Common Core that, as I discussed in the literature review, have not been fully aligned to the Common Core due to the rush to publish (Polikoff, 2015; Tran, 2016). A first and second grade teacher from the East mentioned in the survey, "The textbooks that are aligned to CC in our state are terrible and only confuse the students. They are too wordy - focusing on reading not math skills. So they don't show what our students can actually do."

Due to this complexity in the standards, many teachers felt unprepared for the Common Core transition. Faith stated, in her interview, that "they threw the standards at us three or four years ago and they didn't slowly put us into it and that made it very difficult." Speaking further on the feeling of rushing into the standards, Diana lamented, "We didn't have brainstorming sessions, it was like 'ok, go!' And the speed of that transition just didn't prepare us as teachers to prepare our students." These statements are in line with studies that have shown that the majority of teachers did not receive any professional development about the Common Core (Sawchuk,

2012) and that many teachers felt rushed into the standards without feeling adequately prepared (Henderson et al., 2015; Iannone, 2015; Lee, 2011). Alice addressed these feelings and clarified some difficulties when she said in her interview,

> They just dropped Common Core in our lap and said, 'here you go!' There was no way to do it or… I think all of us in the Deaf school, we were all a little bit stumped and like 'how are we going to do this?' And then it's law and required and there seemed to be way more factors involved and we 'just need to learn it.'

Not only did she mention the rush and the feeling of being ill-prepared, but she also touched on the fact that by being mandated by law, the standards of the Common Core were distasteful to many people (Peterson et al., 2016; Pew Charitable Trusts, 2014; Stern & Wood, 2014). Further, she spoke of "more factors" involved in the Common Core, which I have called the Common Core State Standards Initiative in the review of the literature, as well as the changes in textbooks, testing, and expectations for teaching that came along with the Common Core and that many teachers have found difficult beyond just the rigor of the standards (Burks et al., 2015). This is not to say that teachers could not become prepared. Diana spoke more about her experience with the standards and had personal learning that helped her:

> I was on the committee that went through it when we first adopted the Common Core and we took the documents from the Common Core website and copy-and-pasted them into checklists so that we could use and keep in our classrooms so they were a little more user-friendly. So, I had to spend a lot of time really reading through K-5 and really reading everything and after a while I was able to see patterns and how it fit together and what went from year-to-year, but I don't feel like everyone else had that big picture.

Diana notes that her efforts to see the "big picture" of the standards helped her but that her colleagues did not have that opportunity. In my own experience, a group of teachers and myself at the New Mexico School for the Deaf spent the better part of a year unpacking the standards and defining key standards for each grade year. This experience was extremely beneficial, but was limited to a small study group rather than all teachers who teach mathematics. This need to unpack the standards relates to the textual complexity of the standards, which has already been discussed, and how teachers feel they need training just to understand what the standards are requiring, in addition to the additional expectations that the initiative brings to teaching under the Common Core (Brooks & Dietz, 2013; Burks et al., 2015; Conley, 2011; Roberts, 2016; Shanahan, 2015).

Of course, when speaking about complexity, we must consider the impact of the "rigor" of Common Core standards (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010i) on students themselves. One difficulty noted by teachers is that students who have entered school not at the academic level expected of them struggle with the Common Core, which is only compounded over time (Costner, 2013; Haager & Vaughn, 2013; Heitin, 2016; McLaughlin, 2012). Bria spoke of this difficulty when she said,

> The Common Core definitely applies to on-level students. Students who aren't on-level have a really hard time fitting the Common Core. They have a lot of gaps and have a hard time meeting those standards; that is awkward in trying to meet those students' needs.

Two survey respondents, one with one year of teaching experience and another with 19 years of teaching experience stated respectively, "There are no lower levels to address the gaps in student's learning. If the students only learned half the 2nd grade standards and move into 3rd grade, they are still missing learning from before" and "The students tend to be delayed already.

Common Core does not address the slower learners." Those two teachers taught at ASL/English programs, but the problems extend beyond students who use sign language. A Listening and Spoken Language teacher from the West noted,

> All but maybe a handful or two of students at my school are below grade level, so grade level standards are inapplicable. Teachers feel pressured to rush through standards instead of being able to take time for students to master basic prerequisite skills.

What is interesting is that teachers who participated in both the survey and the interviews spoke of the difficulty of the Common Core, but it was always in the context of student delays, rather than the actual content of the standards for students. Another aspect of the rigor is, as Alice put, "it's kind of boring sometimes" for the students. Other teachers made brief comments using essentially the same phrasing, sharing that the complexity led on-level students to feel unexcited by what they were learning and below-level students to feel bored because of the inaccessibility of what they were expected to learn.

Of course, not all the discussion about the Common Core was negative; teachers perceived some positive aspects and impacts, although positive comments were greatly outweighed by the negative ones. In a terse statement, a third grade teacher from the West who identified as a cisgender female, described the Common Core as "Expos[ing] them to grade level skills and critical thinking. Giv[ing] them multiple avenues for solving problems." Although brief, this statement captures two aspects of the Common Core that teachers enjoyed: rigorous, high level skills and approaches to problem solving/thinking. Speaking of the high-level skills required in teaching, Alice explained how the Common Core changed her teaching,

> I'm more specific with the lessons I teach, because the Common Core is so specific that I have to make sure the kids understand every single aspect of each of those standards. In

> the past, we have not had Common Core; it was more general, we could cover the topic using different things.

Cindy saw positive growth for her students due to these high standards and "because of those high expectations I've seen many students meet those skills and have dramatic improvement. Without the Common Core, we wouldn't be pulling that out of the kids." Gina also discussed this increased rigor, and spoke generally about the Common Core's strength,

> I would say that it definitely encourages higher education. And I think that was something that was lacking for a long time. So, like when I was in school, they kind of just taught the basics and I had to teach myself how to do things differently or figure out why things make sense."

A teacher from the Midwest in a Total Communication program said, along a similar vein, "I think the Common Core Standards set a goal of excellence; goal of complete mastery at a high cognitive level." The achievement of the rigorous standards at high levels of thinking was a theme many teachers mentioned. A teacher from the East with two years of experience explained, "The Common Core encourages more higher order thinking than previous standards, which should be encouraged for all students." When discussing the future of the Common Core, Elizabeth was adamant, stating, "I believe that it is important and we have to produce students who can use those higher level thinking skills, we have to!" Raising the expectations and rigor of national standards was one of the goals of the Common Core (Bunch et al., 2013; Conley, 2011; McLaughlin, 2012; McNulty & Gloeckler, 2014; National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010h, 2010i), and raising thinking skills, depth of learning, and the creativity in approaching problem solving were less defined

goals of the Common Core State Standards Initiative (Bestor, 2016; Brenneman, 2016; Brooks & Dietz, 2013; Heitin, 2016; Iannone, 2015; Roberts, 2016; Shanahan, 2015; Stern & Wood, 2014).

This study focused specifically on the impact of the Common Core on elementary mathematics teachers of the deaf/hard-of-hearing. The previous discussion focused on the Common Core generally; now I turn my attention to the Deaf Education-specific experience of the participants. Most of the themes related to Deaf Education discussed by the participating teachers focused on language, both English and ASL, and its use, limitations, and connections to the Common Core. This aligns with current themes and literature regarding Deaf Education, as the central issue of working with D/HH students is language (Baynton, 1993; Hult & Compton, 2012; Veditz, 1913).

Many teachers in interviews and many comments made by survey participants lamented the delays D/HH students have when entering school. A teacher from the West with 10 years of teaching experience in an ASL/English program spoke of the challenge of kindergarten teaching:

> Roughly, 90% of the time, Deaf and Hard of Hearing students enter kindergarten at a three year language level or below. There is absolutely zero percent chance that Common Core can be taught to students who do not already have a strong language foundation. Ironically, many students enter kindergarten for the first time having never been in school before, and many of these hearing students do not have as strong of a language foundation to tackle Common Core. Now, think of Deaf and Hard of hearing students whose parents have just now decided to teach their child ASL and put them in school for the first time at 5 years old. Common Core standards are unattainable.

Students not having the language foundation was a concept commented on by many of the survey participants and all the interview participants. A hearing teacher from the West stated

bluntly, “There is absolutely zero percent chance that Common Core can be taught to students who do not already have a strong language foundation.” Heather spoke frequently of the lack of “flexibility” to address any students with delays. Although it is easy to see the impact of language delay on English language arts, a teacher from the South with three years of experience spoke of the impact on mathematics:

> The majority of my kids come to our school from public school with no language. Large percentage of my students have hearing parents who do not sign. I have had students come to me in third grade and have the language ability comparable to a four year old. They do not have the language for the word problems in Common Core math.

One of the few male teachers who participated in the survey, who also is Deaf, focused on the impact that language delays have on teaching when he stated, “Due to language barriers, it takes my students three to five times longer to learn math Common Core skills when compared with those with at least one strong language skills.” This difficulty also extends to students answering questions to the level of complexity, rigor, and depth expected by the Common Core. As one upper elementary teacher from the South explained,

> Because Common Core requires students to process information, then explain it well using the right vocabulary, it ignores the fact that our students didn't have full access to a language until they arrived at our school. They struggle with explaining and writing what they know because they struggle with the language.

Alice spoke passionately about the difficulties with delayed language in her students, “With language we can semi-do it, but without language they are just set up to fail. That’s just not fair that that they either have to sink or swim, there’s no other option for these students.” Diana

emphasized the multiple expectations of the Common Core while teaching mathematics, and the challenge of language in that,

> I think what was hard is that there's a lot of explaining required. That it wasn't just being able to compute to do processes, you needed to be able to talk through and explain what you're doing, and I think that deaf children are completely capable of doing that, but I think because teachers felt uncomfortable with it because the teachers didn't have training, didn't have the language, it wasn't natural and acceptable to them, so that teachers were awkward with what they were trying to teach in terms of explaining. One chapter would say "describe" and another would say "explain" – some of the children that we work with that's a whole day's lesson that 'describe' and 'explain' mean the same thing and then what do you do, what does that mean, what is the action that goes along with it? So, I felt like that was really hard, the access to the language needed, particularly for students who are deaf and hard-of-hearing really was a challenge because so much of the skills required such a huge language component and that did add an additional layer of challenge for us because we weren't trained in how to carry that out.

An upper elementary teacher from the East commented on an additional difficulty, "very little formal material is designed for the unique language needs of students who are not only Deaf/HH but often come from homes that speak a language other than English." Deafness is not a homogenous disability group (Christensen, 2000), and many students come from homes that are not the typical white American, English-speaking household (Bowe, 1971). Cindy considered this, and wistfully commented,

> I did think there needs to be more opportunities for bilingual experiences and value a student's first language. I'm pretty sure I read that for Hispanic students, or ELA

> students, they are frustrated because 'it's all about English'. There's no culture, no value, no time for Deaf needs. I think that's something that needs added… I don't know. Time for bilingual education.

This adds a unique ELL dimension to Deaf Education, especially in light of the English language expectations of the Common Core. Commenting on this multicultural challenge of the Common Core, Faith lamented,

> With the reading, deaf kids are always going to have that struggle if they're not on grade level, but I think with the vocabulary and some of the names… you know, American names don't seem to be anywhere near, I don't think American names are in there. I'm all for diversity but you have to explain 'this is a boy name; this is a girl name' and you really don't want to have to do that all the time, it would be nice for them to see some American names in word problems and things like that.

Beyond just language delays, many teachers spoke of academic delays D/HH students begin with that impact their ability to succeed with on-level standards. A teacher from the Midwest working in a Total Communication program commented,

> There are so many remedial skills that need to be worked on, that it is difficult to add or expand the lesson to include Common Core. Often, I cannot teach each Common Core standard as it is stated because I have to teach more background knowledge to help students understand what is being asked of them. Compared to hearing children, Deaf children only receive information if they see it, while hearing children hear it on the radio, overhear their parents talking, or hear it watching TV. They may not even be watching their peers, but they overhear their friends talking and learn that way. Deaf children often live with families who do not sign; therefore, these children do not have

> nearly the same background knowledge of the world as their hearing peers. The Common Core standards are quite foreign to them since they don't have enough background knowledge to full understand what they are meant to learn.

These delays end up compounding from year to year. An upper elementary teacher from the Midwest spoke of the speed of the standards, "The pace is difficult for some of my students who have not mastered concepts and skills in previous grades," showing that the compounding efforts to catch-up to on-level become quite difficult. As Gina lamented, "However, I think that, like my students are in 6th grade but functioning on a 1st grade level. So, I'm technically supposed to pick a 6th grade standard but there's no way I can actually teach that." Commenting on these struggles, Bria contrasted students with and without delays,

> For some of my students, there are no issues and they progress just fine. Some students … wow, especially now with the end of the school year, I'm concerned about next fall and if they'll be able to progress at that higher level because things get harder and harder as the grades progress. Expectations get higher; that's my biggest concern… as the years go by the expectations for reading and writing go up-and-up and not down and students may feel thrown in that place where they fall behind more. And most students don't have the family background where there's a mindset that they are able to do their best. Some students come with the attitude of 'I'll just come to school and learn and be there and that's good enough' and we have to explain that they will have to meet the state expectations and I feel that's where students struggle the most.

These feelings have been reflected in the literature that D/HH students often begin school with delays; some studies I reviewed specifically noted delays in mathematical skills as early as D/HH preschool students, and that students have a difficult time achieving at levels equivalent to

their hearing peers, especially when language delays have occurred (Hrastinski & Wilbur, 2016; Kritzer, 2009, 2012b; Kritzer & Pagliaro, 2013; Mounty, Pucci, & Harmon, 2014; Pagliaro & Kritzer, 2010, 2013).

Thinking specifically about the use of ASL in the Common Core, I discussed in the review of the literature that ASL is only specifically mentioned once within the Common Core State Standards, but only referring to how "s*peaking* and *listening* should be broadly interpreted to include sign language" (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010c, p. 6). The teachers in this study also commented on the role of ASL, beyond the functioning of language already described in this section. One teacher from the West stated some of the difficulties on the use of ASL for teaching the Common Core:

> Deaf students have a greater challenge to not only absorb the math concepts but they are always reading the math word problems in English. Since there is no written language for ASL, they always struggle to understand what the English phrases mean. Math programs out there aligned with CCSS are not translated into ASL. A teacher with hearing students might depend on the math program to voice the questions and explanations to the students, while a teacher for Deaf students has to translate the sentences from the math program into ASL and then wait for students to answer. Sometimes, I have to show other movies to help them understand the concept before moving on with the movie. This is much more time consuming.

This teacher also clarified the subtle difference between ELL students, called ESL by this teacher, and D/HH students:

> Deaf children are not ESL students. It is not as simple as changing the programs to be more ASL friendly. ESL students already have a first language foundation and are

> learning English as well. Our students are learning ASL (for the first time) at the same time that we are expected to be teaching them content in this same language. This is impossible.

One seeming similarity that is actually a difference between ELL and D/HH students is the role of test interpretation. Several of the teachers commented on the need to interpret textbook passages and standardized test prompts into ASL, especially "extended explanations," a frustration shared by a teacher from the Midwest with 20 years of experience. For ELL teachers, their students will make the eventual switch to English, at least for listening to passages, while D/HH students who use ASL often will just remain in the use of ASL and the written form of English (Hult & Compton, 2012; Marschark, 2014; Saulsburry, 2014; Spencer & Marschark, 2010), necessitating the role of a teacher as a translator for every testing situation and many common text reading situations.

Many of the teachers in this study who use ASL as a language of instruction with their D/HH students felt that the Common Core did not have room for the use of ASL for instruction, learning, expression, or testing. Faith lamented the unique challenges of teaching mathematics vocabulary to D/HH students who use ASL,

> With the vocabulary, when you teach hearing children when they hear the word they can recognize it, but when you're working with deaf kids depending on how difficult the structure is in your tests you may have to fingerspell the word but a hearing kid doesn't know how to spell 'trapezoid' or 'parallelogram' but a hearing impaired child has to learn how to spell it because there's no sign for that, so there is differentiation in the challenges for language and vocabulary. This is a battle that goes back and forth, if you use the sign they may not get the definition of what the word is for the sign but you may also be given

> them the definition when you use the sign, so there's that piece. That's one of the challenges. I think that pacing is a challenge. It's hard! It all depends on who you're talking to and who your audience is and how that gets interpreted. When you're talking with kids or adults who are deaf and you sign 'perimeter,' you sign '*perimeter*' and you do a round thing, but is that a giveaway to the definition? You don't fingerspell 'perimeter.'

This challenge also impacts how students perform on standardized testing. Using different interpretations, different local signs (several participants briefly stated that there is no true standardization of mathematical sign vocabulary in the country), and even subtle decisions of what sign to use while interpreting the test (such as the example given by Faith about whether or not to spell *perimeter* or use a sign or gesture to indicate its use) all have impacts on D/HH student achievement (Mitchell, 2008; Qi & Mitchell, 2012). Heather also highlighted standardized testing challenges:

> I think it has created more pressure for teachers because it means we have to 'teach to the test.' Accountability has become a big issue because of the Common Core. Teachers are now deemed good or poor based on their students' performance on these tests. Also, there are so many standards that teachers have to teach in one year, which has led to the lack of freedom and flexibility in teaching and scheduling is limited because of its rigid structure. Due to the time restrictions and amount of standards required to teach, teachers often do not teach concepts with sufficient depth for students to fully grasp. Many teachers have struggled with Common Core because it is not easily modified for students that have disabilities.

Beyond just how ASL is used for signing mathematical concepts, Bria pondered about the unique bilingual challenge of deciding a student's competency in mathematics when one language shows it more than another:

> For Deaf students who are on level, they can pick it all up easily. Students who are strong in sign but weak in reading/writing (not on-level, below-level) they struggle the most. The Common Core requires a lot of reading, even in math, science, or social studies. They have the concept and understand it, but when it comes to writing they can't – where should I stand in that? Have they met that standard? No, they haven't because they can't read or write, but in sign, conversation, and thinking they do. How do we navigate this? That's my struggle. Where does this kid stand?

This asks a powerful question of bilingual education: if a student is not proficient in mathematics in English, are they considered truly proficient? The difficulty, as well, is that D/HH students function in some ways as ELL students but in other ways as special education students, thus straddling a unique line that is not forgiving on either side. Cindy, in speaking of the ELL experience to help understand the D/HH experience, noted,

> I did think there needs to be more opportunities for bilingual experiences and value a student's first language. I'm pretty sure I read that for Hispanic students, or ELA students, they are frustrated because 'it's all about English.' There's no culture, no value, no time for Deaf needs. I think that's something that needs added… I don't know. Time for bilingual education.

In addition to the apprehension and negative attitudes, one area of praise for the Common Core was the ability to be truly aligned in standards, curriculum, and expectations across multiple schools and states. One of the very few male teachers who participated in the survey

and who has 36 years of teaching experience very clearly stated that a positive of the Common Core is that "students are held accountable to the same standards as hearing children." Diana, speaking of this impact on her school, said,

> I think in the beginning it did for us because when the Common Core was adopted that's kind of about the time the school I work at really started paying attention to what was going on and really looking at the state standards that we had in place here [in a state in the Midwest]. Thinking about making sure what we were covering was preparing our students for when they were going out. Initially, it definitely impacted how I taught because I had to make sure that the content I was teaching aligned with that, so if there was something that… I mean… there were some things I was like "I don't need to spend so much time on that" this year because I could see the student was going to get that next year.
>
> The strengths [of the Common Core] are that they're national. In my experience, children who are deaf don't have the same opportunities, they sometimes move around, they're transported a lot. I think one of the benefits is that they're getting access to the same education in the same places and being prepared because, it's so hard, when they get behind, especially if you've been teaching them not the right material or they missed out on something, that catch-up just gets exponential as they get older and so I really the idea of 'oh, we're all teaching the same thing so I'm not going to skip something you're going to need to know somewhere else and you're automatically behind.'

Gina addressed this, in more general terms of the Common Core, "In all honesty, I do feel that the Common Core has a lot of strengths – like throughout the country trying to encourage higher levels of education, which is a good thing." These feelings are reflected in the writings of

Common Core proponents who see the national unity as a strengthening and supporting force in education to improve rigor and quality of instruction (Brooks & Dietz, 2013; Conley, 2011; Peterson et al., 2016; Schmidt & Burroughs, 2013; Stern & Wood, 2014).

For Deaf Education, this national connection is helpful as there are relatively few Deaf schools in the United States (American Annals of the Deaf, 2016a) and the opportunities afforded by collaboration are important to improving educational quality in Deaf schools (Harrison, 2016; Nomeland & Nomeland, 2012). The other aspect the teachers mentioned, aligning Deaf Education fully with public schools, reinforces the notion that D/HH students should achieve at the same levels as their hearing peers, an idea that special educators who are proponents of the Common Core suggested during the implementation of the Common Core State Standards (Costner, 2013; McNulty & Gloeckler, 2014; Polikoff et al., 2016; Saulsburry, 2014; Schmidt & Burroughs, 2013). Heather spoke of the usefulness of the standards in this way,

> It has helped me become aware of what my students should learn. These standards help me understand and determine if my students are at, below, or above grade level. The standards are easily accessed on the internet, which makes it easier to develop year plan, create lesson plans, and show the parents what their children should be learning.

Another positive aspect of the Common Core perceived by teachers of the D/HH is the achievement they have seen from their students. Elizabeth stated that she is teaching differently and has raised her expectations for her students, “On one hand, it has made me (two things really) teach with the end in mind like never before. And, also, it has helped me to require deeper thinking from my students, to require those higher order thinking skills”. Cindy spoke in a similar vein in talking about her student achievement,

> A pro is that it [the Common Core] sets high expectations for students and because of those high expectations I've seen many students meet those skills and have dramatic improvement. Without the Common Core, we wouldn't be pulling that out of the kids.

This jump in achievement has been experienced across many states and schools, as the rigorous expectations of the Common Core have raised some teachers' and schools' pedagogical practices (Brenneman, 2016; Heitin, 2016; Iannone, 2015; Peterson et al., 2016).

In both the survey and the interviews, participants were asked how they would improve the Common Core, if they thought it should be improved. A few teachers answered that they did not see a need to make changes to the standards, for example when Diana stated, "To be honest, for me, I don't think it's about changing the Common Core because I don't think that the standards were wrong." However, those teachers were dramatically in the minority, especially when it came to teachers who followed an ASL/English philosophy. The first suggestion that came from these teachers was to change the Common Core State Standards to a more leveled set of standards rather than a single block per grade level. Gina stated this concept in broad terms when she said,

> I would think that if they could break it down, a little bit, and have different levels of mastery. Maybe if they had a general content and then you do the skill and then separately add-on where you explain how it works.

Alice spent more time on this idea and gave a more in-depth explanation of how she would improve it but also noted a potential downfall to this:

> But I feel there just needs to be another… a broken-down version of Common Core with standards that are more specifically selected. Say 'if your kids maybe meet these requirements, maybe they're coming to you late in language or this is a second language

> for them'… I would rather have a separate set of standards that say 'these are the most important standards your kids need to learn right now.' If we can get past that and go to some other ones that would be great, kind of like standards A and if they meet that then they can move on to standards B, otherwise they just do all the A standards. For the kids that can do it, that's great! They can follow the Common Core as is. What scares me about that, though, is actually categorizing kids into boxes. I like it but I also how feel 'how do I determine what kind of future you're going to have by putting you in this box?' So, it's what I want, but also not.

A new third grade teacher in the Southern part of the United States suggested, in line with what Gina and Alice said, "The standards should be more fluid, more of a scale that kids can more through, rather than set levels that sometimes have no correlation to the previous year." There are versions of this concept, such as the New Mexico Extended Grade Band Expectations (New Mexico Public Education Department, 2012) created by the state of the New Mexico or the Utah Essential Elements (Dynamic Learning Maps, 2017) created by the Dynamic Learning Maps Consortium, however these leveled and narrowed standards sets are geared more for students who demonstrate cognitive disabilities. What these teachers spoke of, however, are leveled sets of standards that can be used with students who show only mild to moderate delays academically or linguistically to support them in achieving at true grade-level content and rigor. This related to the desire of teachers and researchers more generally to be able to meaningfully access an appropriate number of age-appropriate standards, which some believe the Common Core is not achieving (Peterson et al., 2016; Polikoff, 2015; Sawchuk, 2012; Shanahan, 2015; Stern & Wood, 2014; Swars & Chestnutt, 2016; Tucker, 2016).

Beyond just a leveled set of standards, some teachers advocated for creating a "Deaf" set of Common Core standards. Of those teachers who participated in the interviews, Bria spoke often of this. In her interview, she spoke about understanding D/HH student needs, and seeing that she is a Deaf individual herself, her concern becomes all the more poignant:

> I hope that Deaf Education will develop their own Common Core that is separate but aligns with the hearing Common Core. There are many things in the Common Core that don't apply to our school. I have optimism for the future of the Common Core if they develop their own Common Core.

She then spoke of the role of ASL for D/HH students and mentioned, as I quoted before, of how a student may be achieving in ASL but their knowledge is not reflected in English skill. At the end of the interview, she spoke of how a national group is developing a set of ASL language standards that are meant to align with the rigor and expectations of the Common Core, but for ASL (Laurent Clerc National Deaf Education Center, 2017). Although a worthwhile and important effort in Deaf Education spanning this decade (Warshaw & Mitchell, 2014), this is not what Bria meant:

> That's good for ASL, but what about for D/HH students so they can learn math, science, social studies, reading, and writing – they should have their own standards, not only for ASL itself (those may be used for public schools, as well) but it's not enough for D/HH students. That's where subtle changes need to be made. I feel that the Common Core can provide for their needs, for sure, with subtle accommodations. I'm not sure if the Common Core is aware or understands special education in general… maybe not, it seems to apply for general education.

Bria's comments lie within the schism that special education has under the Common Core. Many have written of the intent of the Common Core to see achievement for all special needs students at a level similar to their peers without special needs (McLaughlin, 2012; McNulty & Gloeckler, 2014; National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010b), however not all educators see the ease with which these students are supposed to be achieving (Bestor, 2016; Brooks & Dietz, 2013; Costner, 2013; Haager & Vaughn, 2013; Neria, 2014), and, as mentioned earlier, states have taken efforts to create standards for those students with more moderate-severe special needs aligned with but separate from the Common Core (see New Mexico Public Education Department, 2012, or Dynamic Learning Maps, 2017). A Deaf male teacher with more than 10 years of teaching experience also talked about this topic. He referenced two types of groups of students in Deaf schools who use ASL: Deaf of Deaf, meaning those D/HH students who have Deaf parents and generally come to school with age appropriate langauge skills in ASL; and Deaf of Hearing, meaning those D/HH students who have hearing parents and may or may not come to school with age appropriate language abilities. He stated,

> I believe the Common Core team need to visit Deaf schools (both residential and public school) and do research on the average time it takes for Deaf children of different groups (Deaf of Deaf on level, Deaf of Deaf below level, Deaf of Hearing on level, Deaf of Hearing below level, Deaf of Hearing plus other disabilities) and research the length of time it takes for them to reach level of instruction on their grade level.

Alice spoke more specifically of having a leveled set of standards, but she also spoke to D/HH specific needs not addressed in the current Common Core:

> I don't know enough about it with hearing schools and if it's going great or working well or not working well. I think it needs to be tweaked. I do hope that is the case a little bit, that they change it up a little bit. For deaf kids, there needs to be some changes to this.

Heather spoke in more general terms, but had the same feelings of a need for change:

> I believe that if Common Core is not modified for students with disabilities such as deafness, it does not have a good future in Deaf Education. I do not think that the Deaf Education teachers will put up with Common Core because they are tired of the extra work that they have to do in order for their students to succeed. It does not necessarily help these teachers in helping their students prepare for college. Also, I believe that the Board of Education would eventually have to modify or eliminate it because there are too many issues ranging from poor test results to high teacher turnovers. In order for it to be successful in Deaf Education and Special Education, the Board of Education will need to have a 'sit-down' with these teachers and determine how Common Core should be written. They have to understand that it cannot be 'one for all' because everyone learns differently. In order for everyone to succeed, the Common Core has to be flexible and easily modified. The time restrictions should be eased with extra standards written for struggling students.

For teachers who spoke of this *Deaf* Common Core, they did not provide details on what they believed it would be like, only that it would *understand* their students better. This, I suggest, is just an extension of the discussion of Deaf control of Deaf schools (Bahan, 1986; Bailes, 1999; Berthier & Henry, 2009; Gallegos, 2016; Marschark & Hauser, 2012) and the cultural connection of Deaf identity, needs, and language to the Deaf school (Baynton, 1993; Garretson, 2001;

Harrison, 2016; Hult & Compton, 2012; Lane et al., 1996; Levesque, 1990; Nomeland & Nomeland, 2012; Senghas & Monaghan, 2002; Veditz, 1913).

Integration of Quantitative and Qualitative Data

Integration of the two types of data collected throughout this study is an essential component of coherent mixed methods research to avoid treating this as two parallel studies (Creswell, 2015). Although the concept of integrating these interrelated data streams makes intuitive sense, there are many reasons why mixed methods research is less mainstream than quantitative or qualitative methods due to the potential complexity of integrating numerical and narrative types of data. For this study, I felt that the best method for integration was to use a comparative table of the themes of the qualitative data (Creswell, 2014; Ivankova et al., 2006; Morse, 1991). Table 15 displays the integration of the data of this study.

Table 15

Comparative Data Table for the Integration of Quantitative and Qualitative Data

Key Theme	Quantitative Data	Qualitative Data
D/HH Achievement under the Common Core - Positive	1. Of survey respondents, 46.6% (n = 28) agreed or strongly agreed that the Common Core helps them teach better. 2. Deaf teachers have a more positive perception of the Common Core (total belief score = 17.82) compared to hearing teachers (total belief score = 14.56). 3. Teachers who had more than two trainings in either mathematics or the Common Core had higher total belief scores than those who had less than two trainings. Those with training in mathematics had a combined total belief score of 16.10 or higher compared to 14.67 or lower for those with less trainings. Those with training in the Common Core had a combined total belief score of 17.31 or higher compared to 15.22 or lower for those with less trainings. 4. Teachers who participated in the survey believed that their textbooks aligned to the Common Core (70%, n = 42). 5. 43.4% (n = 26) of respondents agreed that the Common Core helps students succeed.	1. "I think the Common Core standards set a goal of excellence; goal of complete mastery at a high cognitive level." Survey, Midwest Hearing teacher in a Total Communication program 2. "It does require them to think." Survey, South Hearing teacher in an ASL/English program 3. "Common Core expects me to teach the why and how of mathematics not just the procedure. Concepts often begin with concrete which my students can learn through hands-on and visual methods." Survey, Midwest Hearing teacher in ASL/English program 4. "Students are held accountable to the same standards as hearing children." Survey, South Male Hearing teacher in an ASL/English program 5. "I'm more specific with the lessons I teach, because the Common Core is so specific that I have to make sure the kids understand every single aspect of each of those standards. In the past, we have not had Common Core; it was more general, we could cover the topic using different things. I feel like we're having to teach every lesson every step of the way. I can't really jump around too much, the way that we teach Common Core specifically with math I do feel that everything builds up on everything. I feel that I teach in a more specific way and I feel that I focus a lot more on vocabulary with the kids and find that I often have to make up my own games to be able to

		meet their needs. I know what I want to do." Interview, Alice 6. "The strengths are that they're national. In my experience, children who are deaf don't have the same opportunities, they sometimes move around, they're transported a lot. I think one of the benefits is that they're getting access to the same education in the same places and being prepared because, it's so hard, when they get behind, especially if you've been teaching them not the right material or they missed out on something" Interview, Diana 7. "A pro is that it sets high expectations for students and because of those high expectations I've seen many students meet those skills and have dramatic improvement. Without the Common Core we wouldn't be pulling that out of the kids." Interview, Cindy
D/HH Achievement under the Common Core - Negative	1. Of survey respondents, 70% (n = 42) stated that the Common Core limits their flexibility in teaching. 2. 60% (n = 32) of survey respondents disagreed or strongly disagreed that they enjoyed teaching with the Common Core. 3. Teachers average 5 days of mathematics instruction per week but only an average of 1 day per week is considered to be a "Common Core" day. 4. 70% (n = 42) of teachers in the survey "often" or "almost always" teach remedial skills to students as part of their mathematics coursework. 5. 35% (n = 21) of respondents did not regularly complete the Common Core standards by the end of the	1. "It feels like there's just so much more to cover, so many more specific things. Like the way that my standards were set before they could bring more easily math into other areas so we could do math in science and social studies and now it feels like we have to do math as a separate thing." Interview, Alice 2. "For many of my students, we are far below "grade level," which means that CC does not meet their needs. When my students are required to take state tests, they will fail every time because there is no way for them to catch up to be on grade level based on the CCSS." Survey, West Hearing teacher in a Listening & Spoken Language program 3. "But then, some weaknesses, I would say that it doesn't really have any flexibility, I feel. I know that teachers do still have flexibility in

	school, 26.7% (n = 16) only completed them "sometimes", and 31.7% (n = 19) completed all standards with regularity. 6. Teachers showed a majority whose students did not pass standardized tests (48.3%, n = 29) and roughly a third of teachers only had students pass "sometimes" (35%, n = 21).	what they teach, in some sense, but the mastery is very rigid. Especially with testing; I was very frustrated when I was giving my tests this past year because there were many questions which I knew I taught to the kids and they knew at a very basic level they could answer the question, but because of the strong literacy base they had *no* chance of getting it correct." Interview, Gina 4. "However, they are just not reasonable goals for any student with language delays or learning disabilities." Survey, Midwest Hearing teacher in a Total Communication program 5. "However, students who have a lower reading level tend to struggle and rely on staff." Survey, East Deaf teacher in an ASL/English program 6. "It doesn't account for language or cognitive disabilities." Survey, Midwest Hearing teacher in a Listening & Spoken Language program 7. "I have noticed that they have become more stressed and are more aware of how different they are from the norm. Many will end up frustrated and feel like they cannot catch up. I have to spend a lot of time encouraging them that they can do anything despite the fact they cannot hear." Interview, Heather
Understanding the standards and being prepared as teachers	1. Teachers responded that 85% (n = 51) understand the Common Core, 88.3% (n = 53) understand the Common Core mathematical standards, and 68.3% (n = 41) understand the eight Common Core mathematical practices. 2. Teachers generally had more mathematics trainings and types of training (average	1. "The standards are written for math majors, the average student/teacher would have a hard time breaking them apart and teaching each part." Survey, East Hearing teacher in an ASL/English program 2. "They just dropped Common Core in our lap and said, "here you go!" There was no way to do it or… I think all of us in the Deaf school, we were all a little bit stumped and like 'how

	of 2.1 types of training) than for the Common Core (average of 1.2 types of training). 3. Of participants, 86.7% (n = 52) use the Common Core in their math teaching regularly. 4. A little more than half of respondents (51.6%, n = 31) planned lessons with the Common Core in mind often or almost always. A slightly higher percentage (56.7%, n = 34) planned units with the Common Core in mind often or almost always.	are we going to do this?' And then it's law and required and there seemed to be way more factors involved and we 'just need to learn it'." Interview, Alice 3. "We didn't have brainstorming sessions, it was like "ok, go!" And the speed of that transition just didn't prepare us as teachers to prepare our students." Interview, Diana 4. "While at the same time they threw the standards at us 3 or 4 years ago and they didn't slowly put us into it and that made it very difficult. Fourth graders, when we got the Common Core, didn't have K/1/2/3 under the Common Core and so the four graders didn't have all those pre-requisite skills." Interview, Faith
Language rigor and difficulty and the role of ASL in the Common Core	1. All but four participants stated that they disagree that D/HH students have the language capabilities to succeed with the Common Core (93.4%, n = 56). 2. Respondents mainly disagreed with the premise that the Common Core meets the language needs of D/HH students (80%, n = 48). 3. Of the participants, 60% (n = 36) do not enjoy teaching using the Common Core despite the fact that 68% (n = 41) of participants understand the Common Core. Of these same participants, 53.4% (n = 32) disagree or strongly disagree that the Common Core helps them teach better. 4. As mentioned in the key theme of negative achievement, 35% (n = 21) of respondents did not regularly complete the Common Core standards by the end of the	1. "Deaf and Hard of Hearing students often do not have the language skills to access the Common Core." Survey, West Hearing teacher in a Listening & Spoken Language program 2. "The majority of my kids come to our school from public school with no language. A large percentage of my students have hearing parents who do not sign. I have had students come to me in third grade and have the language ability comparable to a 4-year old. They do not have the language for the word problems in Common Core math." Survey, South Hearing teacher in a Total Communication program 3. "The total communication approach has not prepared my students to possess the language skills to meet the rigorous demands of the Common Core." Survey, Midwest Hearing Male teacher in a Total Communication program 4. "Due to language barriers, it takes my students three to five times longer to learn math Common Core skills

	school, 26.7% (n = 16) only completed them “sometimes”, and 31.7% (n = 19) completed all standards with regularity.	when compared with those with at least one strong language skills.” Survey, Midwest Deaf Male teacher in an ASL/English program 5. “CCSS can work for students that come to school with a strong language foundation, have access to American Sign Language in their home environment and at school, and have a strong support system at home where information is consistently shared with them.” Survey, West Hearing teacher in an ASL/English program 6. “Because Common Core requires students to process information, then explain it well using the right vocabulary, it ignores the fact that our students didn't have full access to a language until they arrived at our school. They struggle with explaining and writing what they know because they struggle with the language.” Survey, South Hearing teacher in an ASL/English program 7. “Not a lot kindergarten teachers probably have that issue when they’re teaching hearing kids, because most of the time when a kid comes in with a second language where English is not the first language, they still have a language foundation and they still understand, they just have to learn a second language of English. However, our deaf kids come to school and have language at a 1 or 2 year old level, and I’m expected to teach 5 year old Common Core with them; that’s just not going to work. With language we can semi-do it, but without language they are just set up to fail. That’s just not fair that that they either have to sink or swim, there’s no other option for these students.” Interview, Alice 8. “I think what was hard is that there’s a lot of explaining required. That it wasn’t just being able to

	compute to do processes, you needed to be able to talk through and explain what you're doing, and I think that deaf children are completely capable of doing that, but I think because teachers felt uncomfortable with it because the teachers didn't have training, didn't have the language, it wasn't natural and acceptable to them, so that teachers were awkward with what they were trying to teach in terms of explaining. One chapter would say "describe" and another would say "explain" – some of the children that we work with that's a whole day's lesson that "describe" and "explain" mean the same thing." Interview, Diana 9. "It can't just be a math question, it has to be a math *and* a language question. So, they can't have a strong content area without the language." Interview, Gina 10. "For Deaf students who are on level, they can pick it all up easily. Students who are strong in sign but weak in reading/writing (not on-level, below-level) they struggle the most. The Common Core requires a lot of reading, even in math, science, or social studies. They have the concept and understand it, but when it comes to writing they can't – where should I stand in that? Have they met that standard? No, they haven't because they can't read or write, but in sign, conversation, and thinking they do. How do we navigate this? That's my struggle. Where does this kid stand?" Interview, Bria 11. "The Common Core requires a *lot* of language. They need to communicate thinking, model thinking, and explain their thinking in a variety of areas. Many D/HH students don't have that. Many come

		from hearing families that don't sign, some families are not supportive, some families have skewed expectations and don't understand why their child needs to learn 5 different ways to multiply. With deaf students, it has a lot to do with language." Interview, Cindy
The Common Core doesn't understand D/HH students	1. Teachers in the survey believed that D/HH students have the ability to do well in mathematics (70%, n = 42). However, this same group showed a disagreement that D/HH students have the ability to succeed in the Common Core (68.4%, n = 41). 2. Only one participant agreed that the Common Core was designed with the needs of D/HH students and nearly half the participants *strongly* disagreed (46.7%, n = 28).	1. "It's a lot of work and I think that sometimes, with the math, with Deaf Education, you can't keep the pacing. The pacing is very fast for children who are deaf." Interview, Faith 2. "Deaf children are not ESL students. It is not as simple as changing the programs to be more ASL friendly. ESL students already have a first language foundation and are learning English as well. Our students are learning ASL (for the first time) at the same time that we are expected to be teaching them content in this same language. This is impossible." Survey, West Hearing teacher in an ASL/English program 3. "Yeah, hearing kids, for example, if we were to send them home with vocabulary that's math related the parents could speak in that same language with the kids, the print's in front of them they can make those connections between what they're saying, voicing, and what they're reading in print. When deaf kids go home, even if they have sign language at home, they're not going to be using those *exact* vocabulary words from Common Core in their home environment because they're using a different language from what Common Core is presented in. These parents are going to be signing and unless they actually remember how to fingerspell specific English words, the kids are going to have the concept in sign, which will be great, but it's a lot

	more work to then teach what the vocabulary looks like when they get to class. I do have some great parents who do fingerspell a lot of that vocabulary to them at home and the kids fingerspell back to them and I show them the print in class and it's great that they can actually connect to that. If they don't have that language and they don't have that fingerspelling at home then it's just… confusing those kids. They have to learn in English print and they don't even have the vocabulary in ASL yet either. The English print part of it is really always the hardest part of it. You see, the concepts in ASL are difficult enough anyway to translate math into it and it's complicated and then you have it make sense to them and then… there's a lot more steps for these kids than it is for a lot of the kids who can just listen and know what word to connect it all to." Interview, Alice 4. "With the vocabulary, when you teach hearing children when they hear the word they can recognize it, but when you're working with deaf kids depending on how difficult the structure is in your tests you may have to fingerspell the word but a hearing kid doesn't know how to spell "trapezoid" or "parallelogram" but a hearing impaired child has to learn how to spell it because there's no sign for that, so there is differentiation in the challenges for language and vocabulary. This is a battle that goes back and forth, if you use the sign they may not get the definition of what the word is for the sign but you may also be given them the definition when you use the sign, so there's that piece. That's one of the challenges. I think that pacing is a challenge. It's hard! It all depends on who you're talking to

		and who your audience is and how that gets interpreted. When you're talking with kids or adults who are deaf and you sign 'perimeter' you sign '*perimeter'* and you do a round thing, but is that a giveaway to the definition? You don't fingerspell 'perimeter'." Interview, Faith 5. "Without this, regardless of LSL or ASL use, students struggle with general comprehension, memory, and the ability to logically work through sequences required to gain and retain new knowledge." Survey, West Hearing teacher in a Listening & Spoken Language program 6. "The Common Core places higher level skills at even lower grades than before, so Deaf/HOH students who were deprived of language are falling farther behind. Emphasis on English-based mathematics (word problems). "Speaking and listening skills" do not always translate to ASL users." Survey, East Hearing teacher in an ASL/English program
Need for change in Common Core for D/HH students	1. Participants showed a majority (51.7%, n = 31) who agreed or strongly agreed that they would eliminate the Common Core if given the choice. 2. When looking specifically at Deaf schools, the percentage of teachers participating in the survey who eliminate the Common Core jumps to 68.3% (n = 41) believing it should be eliminated.	1. "I hope that Deaf Education will develop their own Common Core that is separate but aligns with the hearing Common Core. There are many things in the Common Core that don't apply to our school." Interview, Bria 2. "I believe the Common Core team need to visit Deaf schools (both residential and public school) and do research on the average time it takes for Deaf children of different groups and research the length of time it takes for them to reach level of instruction on their grade level." Survey, Midwest Male Deaf teacher in an ASL/English program 3. "Math should be math focused not language driven. It doesn't matter if they can explain what they're doing clearly in writing, if they can do it!!

	Showing your work is an explanation!!" Survey, South Hearing teacher in an ASL/English program 4. "The standards should be more fluid, more of a scale that kids can more through, rather than set levels that sometimes have no correlation to the previous year." Survey, South Hearing teacher in an ASL/English program 5. "I think it needs to be tweaked. I do hope that is the case a little bit, that they change it up a little bit. For deaf kids, there needs to be some changes to this. They can't just expect that these 5 year olds, who are still just learning language, to be given all this jargon and all this math language and be able to understand it right away." Interview, Alice 6. "I would take out the, what I would think of as extraneous and work towards that balance of "we're not going to give you five different ways to solve one problem at the beginning. We're going to narrow the choices." And, yes, you do need to be flexible in how you answer it, but we're going to streamline that and not get bogged down in the process so much." Interview, Elizabeth 7. "I would think that if they could break it down, a little bit, and have different levels of mastery." Interview, Gina

With the integration of the two phases, it is time to attempt to answer the guiding question of this study: What are the pedagogical impacts of the Common Core State Standards on elementary mathematics teachers of the deaf and hard-of-hearing? Of course, when interpreting the answer to this question it must be understood that this study was only exploratory in nature and due to the sample sizes, instruments, and analyses, one must exercise an abundance of caution when attempting to generalize the findings beyond just the scope of the sample of this study, even with the efforts made to ensure validity and reliability throughout the study (see Chapter I for a discussion of the limitation/delimitations of the study and Chapter III for a discussion of the design relating to validity/reliability).

The answer to this question cannot be summed up in a simple sentence. The real impact on the teachers' philosophy and methodology was complex, and many teachers held the Common Core as both good and bad, leading to a two-sided nature to the philosophical interactions of the Common Core for these teachers, which leads to how the Common Core is utilized, sometimes begrudgingly, within their classrooms. Throughout the study, teachers referred to the Common Core not so much as a set of standards, although they defined it as such, but as a living entity that demanded or required certain expectations and achievements from themselves and their students. The main demands of the Common Core were seen as high student achievement and a level of rigor, especially linguistic rigor, that was difficult to attain. Teachers perceived the Common Core as leading students to accomplish and do more in elementary mathematics than had ever been done before, especially in the lower grades. However, teachers also perceived that D/HH students were at a marked disadvantage with the Common Core due to their linguistic delays, a perception that held both for teachers who use

signed methods of instruction and teachers who use listening and spoken language methods. Teachers had a sense of inevitability in the use of the Common Core, or standards similar to it, but not all teachers perceived the Common Core in a negative way, even if they believed the Common Core was not well suited to the needs of D/HH students. However, a large majority of teachers wished for a "second set" of Common Core standards that were designed with D/HH students' unique linguistic needs in mind for both the English Language Arts and Mathematics standards. Those teachers who were from an ASL/English background felt especially adamant about the need for adjustment and accommodation, although they also felt the need to maintain an appropriate alignment with the general education standards. The Common Core was generally perceived quite negatively by the teachers in this study, yet when a student was noted to have high levels of language the students were applauded for achieving high levels of critical thinking, mathematics mastery, and academic achievement seen as a result of the rigor and heightened expectations teachers felt coming from the Common Core. Thus, considering the impact of the Common Core on the philosophical component of pedagogy for these teachers, the Common Core exists simultaneously as an oppressive tool holding D/HH children back because the Common Core does not understand these students and is also simply a set of standards that expects students to achieve at higher levels and teachers can be the instruments to ensure those greater levels of achievement.

The methodological impact of the Common Core was less pronounced. Teachers in the survey spoke of their approaches to teaching, classroom activities, and styles of teaching as not changing much due to the Common Core and their teaching methodologies seem to be more tied to their teacher preparation and choice of Deaf Education setting than to a single Common Core phenomenon. Of course, this is not to say that there have been no shifts in teaching

methodologies, but this study did not reveal any specific trends or statements by teachers as specifically related to the Common Core. When asked if the Common Core influenced their teaching, participants in the interviews spoke more of the philosophical impact than of actual teaching practices. It is possible that the Common Core has impacted the methodology of the participants of this study, but the shifts in teacher practice were not attributed to the Common Core.

The findings of this study suggest that the Common Core has had an impact on teachers of the D/HH teaching elementary mathematics, although the impact varies more by individual than by groups who share identities within Deaf Education.

Chapter V: Discussion

The purpose of this study was to examine the pedagogical impacts of the Common Core on elementary mathematics teachers of the deaf and hard-of-hearing. The Common Core State Standards (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010c, 2010d) came on the educational scene in 2010 and were quickly adopted by a majority of states within the United States and were implemented in schools within the course of a few years. Since that time, the debate on the merits, impacts, and purposes of the Common Core has not slackened (Bestor, 2016; Brenneman, 2016; Burris et al., 2016; Heitin, 2016; Henderson et al., 2015; Pascopella, 2016; Polikoff et al., 2016; Stern & Wood, 2014). This study was undertaken in part to understand how teachers were impacted by the implementation of the Common Core State Standards and the influence of the associated Initiative that came along with the standards.

However, this study was not a general look at the Common Core across all schools, rather, this study focused on a unique subset of education: Deaf Education. Deaf and Hard-of-hearing (D/HH) students find themselves at the crux of a unique linguistic and methodological war that has been raging since the beginning of attempts to educate D/HH pupils (Best, 1914; Bragg, 2001; Cleve, 1993; Lane et al., 1996; Marschark, 2014; National Association of the Deaf, 2016; Plann, 1993; Valentine, 1993), and a war that seems to solely revolve around a single issue: should D/HH students be educated orally or manually, meaning the debate on the role of spoken language versus signed language for D/HH children and adults (Bailes, 1999; Baynton, 1993; Berthier & Henry, 2009; Hult & Compton, 2012; Lane et al., 1996; Laurent Clerc National Deaf Education Center, 2017; Levesque, 1990; Marschark, 2014; Nomeland & Nomeland, 2012; Smith & Wolfe, 2016; Spencer & Marschark, 2010; Veditz, 1913). Although this battle rages,

the teachers of D/HH students find themselves uniquely unified in the education of their students due to two unifying forces: The Individuals with Disabilities Education Act (2004), the federal law governing special education, and the Common Core State Standards (2010), a nationwide set of standards adopted into law at the state level stating what *all* children must learn (Bunch et al., 2013; Costner, 2013; Haager & Vaughn, 2013; National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010a, 2010b). For this study, then, I did not focus as much on the differences of communication philosophy as I did the shared phenomenon of teaching the Common Core to D/HH students. I had originally thought that the communication philosophy would show a clear division between acceptance and fidelity to the Common Core; the teachers in the sample, however, proved me wrong. Deaf Education may have strong differing opinions, but student success is at the forefront of the minds of all teachers of the D/HH, and the Common Core demands a linguistic complexity and mathematical rigor that all teachers were responding to regardless of their personal philosophies.

The intersection of the Common Core and Deaf Education is an interesting one. As I discussed in Chapter II, Deaf Education appears to have a "salvation" mindset in saving D/HH students from an uneducated and disempowered life. The Deaf Community feels a sense of ownership of all D/HH persons and resists the panopticon approaches of education and one-size-fits-all for Deaf schools. However, Deaf schools must teach the state standards and the Common Core represents what many feel is a one-size-fits-all approach (Khaliqi, 2016; Polikoff et al., 2016), which tugs in two different directions: D/HH students achieving at the same level as their hearing peers and D/HH students being accommodated based on their unique needs. This tension was felt throughout the study in the responses of both the survey and interview participants and,

although not as clear as an answer as I had hoped to see, shows the complexity of the issue and the need for further supports for teachers and for further research into this area.

This chapter contains a brief summary of the findings of the study and discussion of my interpretation of their meaning; a discussion of the implications for practice at the school, collegiate, and national levels for Deaf Education; recommendations for future research; and my concluding thoughts.

Summary of Findings and Discussion

The research question guiding this study was, "What are the pedagogical impacts of the Common Core State Standards on elementary mathematics teachers of the deaf and hard-of-hearing?" To seek the answers to that question, I utilized an explanatory sequential mixed methods research design that necessitated the creation of a survey instrument, the Deaf Education Common Core Mathematics Pedagogy questionnaire, for use in the quantitative phase of the study. First, I discuss the reliability of this instrument. Next, I review the integration of the quantitative and qualitative data that yielded six key themes and that constitute the heart of the answer to the research question. Finally, I revisit the conceptual framework that guided this study, Pedagogy, in light of the findings of the study.

Instrument. All instruments used in quantitative research should be analyzed to ensure validity and reliability (Creswell, 2014, pp. 159-161). Chapter III discusses in some detail the process used to ensure validity in construct design. For reliability analysis of the Deaf Education Common Core Mathematics Pedagogy questionnaire, I estimated Cronbach's alpha reliability coefficient, the "mother of all split-half reliabilities" (Vogt, 2007, p. 115) as my method of analysis. The instrument contained three sections: demographics, philosophy, and methodology. The demographics portion did not require reliability analysis as it simply asked for demographic

information. The philosophy section, containing 31 items across four sub-categories, had an initial estimate of Cronbach's alpha of .779. The section required the recoding of two items, as they were stated negatively and needed to be reverse coded. The section also required the removal of seven items; four questions dealt with stress; as teachers may be feeling stress about teaching regardless of their particular philosophies, experience, or feelings towards the Common Core and feeling stress does not necessarily dominate the pedagogy of a teacher (Luckner & Hanks, 2003; Skaalvik & Skaalvik, 2016); one item referred to teaching D/HH students specifically, which did not align with the types of questions being asked, necessitating its removal; and two questions referred to aspects of teaching outside a teacher's own purview (like textbook alignment to the Common Core) and were thus removed. These changes brought the estimated alpha for the philosophy section to .880. All items were analyzed and described in Chapter IV, but those removed were purposefully removed to improve the reliability of the instrument and were not included in overall total scores to describe more general phenomena.

The methodology section performed slightly less well, with an initial estimated of Cronbach's alpha of .764. The section contained 10 items that asked for specific amounts of time, and were thus not included in the analysis, and 18 items that were analyzed. One item needed to be recoded. Three items were removed, as they all dealt with standardized testing, but each measured a different aspect of testing and were not necessarily within a teacher's ability to influence. This brought the estimated alpha up to .771. All items were analyzed and reported in Chapter IV, but those removed were considered outside the focus of the instrument when creating overall scores to describe the general phenomena experienced by teacher participants.

Overall the instrument, as an initial generation of an instrument intended to measure teacher pedagogy and attitudes within Common Core Deaf Education settings, performed well

and provided useful data for this study. For future research purposes, I would recommend researchers make thoughtful modifications to the instrument based on pedagogical theory research, mostly in the methodology section. The standardized testing section, in particular, although it provided excellent information, did not fully capture the teacher's role in standardized testing preparation and administration and future revisions to the instrument should be refined to better show this methodological aspect of teaching.

Key Themes. This study utilized an exploratory sequential mixed methods research design. Thus, the final phase of the study was the integration of the quantitative and qualitative data. In this research design, the qualitative data from interviews served to expand, explain, and expound on the data collected via the quantitative survey. When the data were integrated, six key themes emerged to explain the phenomena of the Common Core experience for these teachers of the D/HH. I discuss each of these key themes in the following paragraphs.

D/HH Achievement Under the Common Core – Positive. Teachers who participated in this study had mixed feelings about the Common Core. One predominant feeling was the positive achievement students were making under the Common Core. From the survey, 46.6% (n = 28) of teachers responded that they agree the Common Core helps them teach better. Also, 43.4% (n = 26) of respondents agreed that the Common Core helps students succeed. Teachers who had more trainings in the Common Core generally had higher beliefs scores for the Common Core than those who had lower numbers of trainings. Interestingly, Deaf teachers generally had higher beliefs scores for the Common Core than hearing teachers. A hearing teacher from the Midwest who teaches in a Total Communication program said of the Common Core, "I think the Common Core standards set a goal of excellence; goal of complete mastery at a high cognitive level." Further discussing the impact of the Common Core, Cindy, a Deaf teacher who works at a day

school in the East, happily stated that, “A pro is that it sets high expectations for students and because of those high expectations I’ve seen many students meet those skills and have dramatic improvement. Without the Common Core, we wouldn’t be pulling that out of the kids.” Teachers seemed amazed at the potential of their students to respond to such rigorous standards and to see their D/HH students accomplish greater feats of mathematical ability at younger and younger ages.

D/HH Achievement Under the Common Core – Negative. All that positive achievement, however, was tempered by the statements of teachers that positive achievement is not universal for D/HH students. Of the respondents to the survey, 70% (n = 42) believed that the Common Core limited their flexibility in teaching. Many teachers who took part in the survey (70%, n = 42) stated they “often” or “almost always” teach remedial skills to students as part of their mathematics coursework, seeing “remedial” as not having yet achieved the standards of the Common Core. Only 31.7% (n = 19) of participants in the survey were able to complete the Common Core standards during the school year with regularity. Generally speaking, the majority of teachers did not have students that passed standardized testing with any regularity. From the survey, a hearing teacher from the West in a Listening and Spoken Language program lamented,

> For many of my students, we are far below ‘grade level,’ which means that CC does not meet their needs. When my students are required to take state tests, they will fail every time because there is no way for them to catch up to be on grade level based on the CCSS.

Also speaking about this struggle, Heather, a Deaf teacher in an ASL/English day program in the South, shared,

> I have noticed that they have become more stressed and are more aware of how different they are from the norm. Many will end up frustrated and feel like they cannot catch up. I have to spend a lot of time encouraging them that they can do anything despite the fact they cannot hear.

Many of the survey participants and all interview participants spoke of this frustration of limited student achievement under the Common Core, especially in light of the language requirements of the Common Core, another key theme of the data.

***Understanding the Standards and Being Prepared as Teachers*.** The Common Core's national implementation followed a fairly rapid timeline. The standards were introduced in June 2010 and by the following legislative cycle, often the beginning of the calendar year in many states, the standards were adopted and, by 2013, 45 states and several US territories and districts had adopted the standards (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2016a). This short time period left many teachers reeling from the rapidity of change. This feeling was described by Alice, a hearing teacher in the West at a residential ASL/English program,

> They just dropped Common Core in our lap and said, 'here you go!' There was no way to do it or… I think all of us in the Deaf school, we were all a little bit stumped and like 'how are we going to do this?' And then it's law and required and there seemed to be way more factors involved and we 'just need to learn it'.

In addition, many teachers stated that the Common Core State Standards style of writing was difficult to decipher. On the survey, a hearing teacher from the East in an ASL/English program wrote about that difficulty, "The standards are written for math majors, the average student/teacher would have a hard time breaking them apart and teaching each part."

Participants responded that 85% (n = 51) understand the Common Core, 88.3% (n = 53) understand the Common Core mathematical standards, and 68.3% (n = 41) understand the eight Common Core mathematical practices. Although the numbers are fairly high, this still suggests that roughly 12% or more of teachers who responded to the survey do not understand the standards they are expected to teach. Even fewer understand the eight Common Core mathematical practices, which are expected to be integrated into teaching and learning (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010i). Teachers had relatively little training and essentially no formal training, such as college courses, about the Common Core. Teachers had nearly twice as many types of trainings for mathematics as they did for the Common Core, suggesting that teachers understood mathematics teaching in general but not necessarily the standards they were to teach or the expectations of the Common Core Initiative that is tied in to the standards.

Language Difficulty and Rigor and the Role of ASL in the Common Core. Language continues to be the central issue of Deaf Education (Hult & Compton, 2012; Lane et al., 1996; Nomeland & Nomeland, 2012). The Common Core also has a strong emphasis on language, specifically English language literacy (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010a, 2010h). This intersection of Deaf Education language needs and Common Core language expectations is a difficult one across communication philosophies within Deaf Education. From the survey, all but four participants stated that they disagree that D/HH students have the language capabilities to succeed with the Common Core (93.4%, n = 56). Further, respondents mainly disagreed with the premise that the Common Core meets the language needs of D/HH students (80%, n=48). From Listening and Spoken Language, a teacher from the West stated, “Deaf and Hard of Hearing students often do not have the

language skills to access the Common Core." From Total Communication, a hearing teacher from the South also said,

> The majority of my kids come to our school from public school with no language. A large percentage of my students have hearing parents who do not sign. I have had students come to me in third grade and have the language ability comparable to a four year old. They do not have the language for the word problems in Common Core math.

Finally, from ASL/English, a Deaf teacher from the Midwest who was one of only two males in the study, reiterated the feeling by saying, "Due to language barriers, it takes my students three to five times longer to learn math Common Core skills when compared with those with at least one strong language skills." One of the subtle but challenging difficulties of teaching Common Core mathematics was shared by Gina, a hearing teacher from the Midwest in a Total Communication program, "It can't just be a math question, it has to be a math *and* a language question. So, they can't have a strong content area without the language." Of course, the language implied is English.

Many D/HH students, especially as represented by schools in this study, use a signed method of communication, usually ASL or Total Communication but others are used (Vasishta & Tompkins, 2001). The Common Core State Standards only mention the possibility of ASL in the English Language Arts standards:

> The Standards should also be read as allowing for the widest possible range of students to participate fully from the outset and as permitting appropriate accommodations to ensure maximum participation of students with special education needs… *speaking* and *listening* should be interpreted broadly to include sign language. (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010c, p. 6)

Although that is mentioned, the reality of using ASL fully to meet the expectations of the Common Core is challenging. Bria, a Deaf teacher in an ASL/English program in the West, spoke to this unique challenge of working with ASL user D/HH students under the Common Core:

> For Deaf students who are on level, they can pick it all up easily. Students who are strong in sign but weak in reading/writing (not on-level, below-level) they struggle the most. The Common Core requires a lot of reading, even in math, science, or social studies. They have the concept and understand it, but when it comes to writing they can't – where should I stand in that? Have they met that standard? No, they haven't because they can't read or write, but in sign, conversation, and thinking they do. How do we navigate this? That's my struggle. Where does this kid stand?

The Common Core Doesn't Understand D/HH Students. With language issues in mind, another key theme that emerged was the feeling that the Common Core does not understand the needs of D/HH students, especially those who are signed language users. In looking at teacher beliefs about their D/HH students' abilities to succeed in mathematics, teachers completing the survey believed that D/HH students have the ability to do well in mathematics (70%, n = 42). However, this same group showed a disagreement that D/HH students have the ability to succeed in the Common Core (68.4%, n = 41). Participants completing the survey were specifically asked if they believed that the Common Core was designed with the needs of D/HH students in mind, Only one participant agreed and nearly half the participants *strongly* disagreed (46.7%, n = 28). Although discussion has been held about the similarities of D/HH students to English language learners, a hearing teacher from the West in an ASL/English program talked about these differences, stating,

> Deaf children are not ESL students. It is not as simple as changing the programs to be more ASL friendly. ESL students already have a first language foundation and are learning English as well. Our students are learning ASL (for the first time) at the same time that we are expected to be teaching them content in this same language. This is impossible.

A hearing teacher from the East also in an ASL/English program shared that feeling,

> The Common Core places higher level skills at even lower grades than before, so Deaf/HOH students who were deprived of language are falling farther behind. Emphasis on English-based mathematics (word problems). 'Speaking and listening skills' do not always translate to ASL users.

Language was not the only concern of teachers for D/HH students to succeed under the Common Core. Faith, a hearing teacher in an Eastern ASL/English program, shared, "It's a lot of work and I think that sometimes, with the math, with Deaf Education, you can't keep the pacing. The pacing is very fast for children who are deaf." A teacher from the West in a Listening and Spoken Language program shared the impact of language delay on more than just language, "Without this [early exposure to language], regardless of LSL or ASL use, students struggle with general comprehension, memory, and the ability to logically work through sequences required to gain and retain new knowledge."

Need for Change in Common Core for D/HH Students. Many teacher participants, especially those who teach in ASL/English programs, felt that there should be changes made to the Common Core State Standards to better support D/HH students, especially those who have language delays and for the use of ASL within the standards. When asked if they would eliminate the Common Core if given the choice, 51.7% (n = 31) of respondents agreed or

strongly agreed. When asked if the Common Core should be eliminated from Deaf schools, the number in agreement or strong agreement jumped to 68.3% (n = 41) of respondents. Bria, a Deaf teacher from the West in an ASL/English day program, passionately said, “I hope that Deaf Education will develop their own Common Core that is separate but aligns with the hearing Common Core. There are many things in the Common Core that don’t apply to our school.” This concept was echoed by a one of the two male teachers, a Deaf man from the Midwest. In his response, he referenced two types of groups of students in Deaf schools who use ASL: Deaf of Deaf, meaning those D/HH students who have Deaf parents and generally come to school with age appropriate langauge skills in ASL; and Deaf of Hearing, meaning those D/HH students who have hearing parents and may or may not come to school with age appropriate language abilities. In the survey, he wrote,

> I believe the Common Core team needs to visit Deaf schools (both residential and public school) and do research on the average time it takes for Deaf children of different groups (Deaf of Deaf on level, Deaf of Deaf below level, Deaf of Hearing on level, Deaf of Hearing below level, Deaf of Hearing plus other disabilities) and research the length of time it takes for them to reach level of instruction on their grade level.

The types of changes advocated were not, as the survey would suggest, a complete elimination of the Common Core. Rather, the teachers who responded to the survey and especially those who were interviewed suggested a parallel set of standards that focuses on key essential standards of the Common Core and allows for flexibility in language (ASL and/or English instead of English only) and being cognizant of the diverse needs of D/HH students, especially those who are language delayed. Gina, a Deaf teacher from the South, succinctly stated her intentions, “I would think that if they could break it down, a little bit, and have

different levels of mastery." Another teacher from the South, a hearing teacher in an ASL/English program, emphatically stated, "Math should be math focused not language driven. It doesn't matter if they can explain what they're doing clearly in writing, if they can do it!! Showing your work is an explanation!!" In yet another suggestion from the South, a hearing teacher in an ASL/English program requested, "The standards should be more fluid, more of a scale that kids can more through, rather than set levels that sometimes have no correlation to the previous year." In a passionate plea for her students' ability to achieve, Alice, a hearing teacher from the West in an ASL/English program, recommended,

> I think it needs to be tweaked. I do hope that is the case a little bit, that they change it up a little bit. For deaf kids, there needs to be some changes to this. They can't just expect that these five year olds, who are still just learning language, to be given all this jargon and all this math language and be able to understand it right away.

Pedagogy. Now that I have conducted the study, I want to revisit the conceptual framework of pedagogy used as the basis for this study. As I stated in Chapter I, "pedagogy" is an interesting term; it is both widely understood and yet there is not singular definition used. For this study, I leaned towards a more Euro-centric view of pedagogy (Ax & Ponte, 2008; Mortimore, 1999) and one that resonated more with conversations, professional development, and personal experience. Pedagogy was defined here as the combination of the philosophy and methodology that a teacher brings to their teaching, in conjunction with the pressures, philosophies, practices, and mandates of policy makers and researchers. In simplest terms, pedagogy is what a teacher thinks about their teaching and what they do because of what they think. In discussing the union of philosophy and methodology to create pedagogy, I drew on existing explanations of the types of pedagogy (Ford & Profetto-McGrath, 1994; Glatthorn et al., 2009) that are seen in teachers. The

three common definitions are pedagogy as product, pedagogy as practice, and pedagogy as praxis. To this, though, I chose to draw on cognitive dissonance theory (Cooper, 2007) to describe what realistically could be a fourth pedagogy: pedagogy in dissonance, meaning a pedagogy where the philosophy of a teacher and their required methodology are not in harmony and create a dissonance in their teaching.

At the time I sent out the questionnaire for the quantitative portion of this study, I truly believed that pedagogy in dissonance was going to be the main type of pedagogy that I would see in participants with a few teachers in the remaining categories. However, what I have observed in both the quantitative and qualitative portions of the study was all four types of pedagogy currently exist within this sample of teachers. The Common Core is having an impact on teachers, as I have already mentioned, but the impact is based more on individual teachers and their existing pedagogies than on other characteristics that were measured in this study. I did not directly measure the type of pedagogy that teachers in the sample group have, accurately identifying which of the four pedagogies a teacher has would require more than a teacher self-reporting their perception or interviewing a small group of teachers which were data collection methods utilized in this study, and so I cannot accurately report the amounts of types of pedagogies. I also entered this study believing that part of the dissonance would be teachers disagreeing with the Common Core but having to use its methodologies, creating dissonance. However, that is not the only dissonance I saw; some teachers reported favorable views of the Common Core but using unsuccessful methodologies, some teachers reported negative views of the Common Core but had success with their students through rigorous methodology, and some teachers had positive views of the Common Core and used best practice methodologies but were still unsuccessful to due factors outside teacher control. Some teachers who have taught for

several years also spoke of pedagogical journeys within the Common Core that changed their philosophies or methodologies over time. This pedagogical influence, regardless of pedagogy type, is expressed well by Bria, a Deaf teacher at an ASL/English program in the West:

> I have to admit that before I started teaching, I was not a fan of the Common Core. I felt that it was very limiting and not really flexible. And, often, teachers were frustrated with how to use the standards to meet the needs of diverse students. When I started teaching, I noticed that it had some positives. I use the Common Core in my instruction, like I said it's guidelines, it tells us what we need to teach. We use it for basic information. How it influences me as a teacher, it gives more rigidity and structure.

Although she spoke positively of the guidance and structure, some teachers did not feel that way. However, the journey into the standards was felt similarly by other teachers in this study.

Part of the reason that pedagogies of dissonance did not more widely show in the study is the possibility that in experiencing the cognitive dissonance generated by the Common Core, teachers felt the inconsistency in pedagogy generated by the phenomenon of the Common Core and were "driven to resolve that inconsistency" (Cooper, 2007, p. 3), similar to a Piagetian notion that disequilibrium drives a person to achieve equilibriation, generating greater intellectual development (Piaget, 1950, 1985; Voneche, 1996); in this case, the Common Core dissonance in pedagogy led to teachers adjusting either their philosophies or methodologies to resolve the dissonance (disequilibrium), resulting in what was seen in this sample. This is in harmony with both Festinger's theory of cognitive dissonance and Piaget's theory of disequilibrium that the experiences of these teachers drove them to change, hopefully for the better, in their own cognitions, attitudes, and actions. Teachers in this sample who responding with more than superficial dissonance resolution were able to go beyond the technical aspects of

the Common Core to a more adaptive, integrative, passionate (I would say salvation-minded) and emancipatory praxis (Freire, 2000; Grundy, 1993).

Limitations

Performing an exploratory study has its fair share of limitations, first and foremost the creation of a new instrument used to measure the pedagogical impact of participating teachers. Although the instrument performed well and analysis, as mentioned previously, validated its use, the fact remains that it was a new instrument and requires more scrutiny over time to completely validate its use and results.

A second notable limitation of this study was that only 60 participants took part in the survey phase of the study. Although their data were incredibly helpful and insightful, this sample size falls short of the intended number of respondents that would allow conducting inferential analyses. This study relied on the technique of administrators forwarding the email to their teachers, and although efforts were taken to connect with and explain the purpose of this study, there is just no way to know how many Deaf schools had teachers participate in the study due to asking for region rather than state or school in data collection. Due to its size, I strongly encourage readers to be cautious in any attempt to generalize the findings of this study outside of the sample.

A third limitation of this study was the translation process time. I followed the translation protocol exactly as outlined in Chapter III, but the Certified Deaf Interpreter I initially hired backed out. The next Certified Deaf Interpreter I contracted took several months to complete the translation of the ASL to English video clips. This left the phase of translation using member checking of the Deaf participants on their own ASL at a disadvantage as the interview was not

fresh enough in their minds, even with access to the video recording, to allow perfect checking of the translation, although all three Deaf participants stated they were satisfied with the translation.

Implications for Practice

Before discussing the study's implications for the practice of Deaf Education, it is important to approach this cautiously. As I mentioned in Chapters III and IV, every effort was made to ensure validity and reliability for this study, however, the sample size for this study was small and the study itself was exploratory in nature. Although I will be speaking in general terms, the findings of this study may not represent the whole of Deaf Education. However, best practices in education may be found in areas, studies, or ways of thinking that are not always perfect in their first steps towards full research. My hope is that readers will look at the findings with a critical and thoughtful eye and that practitioners, policy makers, and researchers, those whose relationship creates pedagogy (Mortimore, 1999), will consider the implications of this study thoughtfully and apply, as appropriate, to their circumstances. There are three areas of implication based on this study: Deaf schools, higher education teacher of the D/HH preparation programs, and Deaf Education nationwide.

Deaf Schools. Deaf schools are unique amalgamations of pedagogy; they represent intersections of regular educational pedagogy, special education pedagogy, ELL pedagogy, and D/HH specific pedagogy. This, coupled with the fact that Deaf Education discussions of pedagogy tend to centrally focus on language philosophy, has the potential to have Deaf schools using less than sufficient training in pedagogy. Most of the participants in the survey had not been trained in the Common Core and several survey participants and interviewees mentioned how they had to dive into the standards to understand them. Thus, even though the Common Core has been the standards of the member states for several years, professional learning about the Common Core

and opportunities for collaborative study of the standards would be highly beneficial to teachers of the D/HH.

Further, the majority of trainings on pedagogy focus on the methodology component of pedagogy. This is not a negative, in and of itself, but it misses the critical component of pedagogical philosophy that is the driving force of the methodology implemented. The four pedagogy types mentioned in the conceptual framework of this study are important for teachers to understand their own pedagogy and, when evaluating their philosophies, allows for introspective praxis and helps teachers avoid potential cognitive dissonance practices in their pedagogy. Allowing opportunities for this self-analytic study, with associated learning, collaboration, and administrative supports, creates a richer professional learning and the depth of *development* often glossed over in education (Fullan, 2016).

Another implication of the study is that many teachers have not changed their methodologies for teaching much beyond using a "Common Core" labeled textbook. Administrators should consider series of professional learning and development aimed at improving instructional practices, using pedagogy as praxis philosophical connections, to allow for appropriate meeting of the rigor of the Common Core State Standards (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010i) and for the greater academic achievement seen by some teachers as a result of the heightened expectations of the Common Core.

Continuing with that thought, as Deaf schools that use the ASL/English philosophy view themselves as working with a linguistic cultural minority (Hult & Compton, 2012; Lane et al., 1996), teachers of the D/HH should consider the pedagogical approaches suggested for use with minority groups. One in particular, Paris' (2012) Culturally Sustaining Pedagogy, I studied in the

context of the Common Core (Harrison, 2016) and found that the Common Core has the potential to be culturally sustaining for D/HH students, but that the interpretation, implementation, and pedagogy of the teachers using the Common Core are the determining factor, rather than the standards themselves.

Finally, a large number of survey participants and most of the teachers who participated in the interviews spoke of the difficulty of language issues associated with teaching the Common Core to D/HH students. Many of this group also spoke of the need for a "Deaf Common Core" set of standards that address the needs of students who come to Deaf schools language delayed. Schools themselves should not create these standards, but, rather, identify the key standards of the Common Core to identify the most critical concepts that must be understand by students before approaching the non-key concepts. Furthermore, Deaf schools should have the honest and difficult discussion about the academic and Common Core achievement of these language delayed D/HH students and create a clear plan to support their learning and strategies to work towards closing the gap in their knowledge and skills. Through this discussion, schools should create curricula, shared pedagogies, and clear expectations in working with students for whom deafness limits their ability to achieve at the level of rigor expected by the Common Core. Of course, schools should also hold discussions on what to do with students who are on level or above level for the Common Core, as well. Part of these discussions, for programs that use sign based communication philosophies, should be the new ASL Content Standards (Laurent Clerc National Deaf Education Center, 2017).

Teacher of the D/HH Preparation Programs. As was mentioned in Chapter II, there are a limited number of post-secondary teacher training programs in the United States that focus on Deaf Education, 63 in total by the last official listing (American Annals of the Deaf, 2016c).

These programs are often philosophically divided on the issue of communication methodology, but they do share a similar goal of preparing teachers of the D/HH for the unique challenges in the field. However, in the urgency of these programs to imbue their chosen philosophical stances into their students, they often miss the necessary step of coupling philosophy with methodology instruction to ensure a holistic pedagogy is being developed within their students, a problematic disconnect noticed in both the early 2000s and in more recent years. (Jones & Ewing, 2002; Kelley-King, 2016). This is not to say that all programs are missing this two-pronged approach to pedagogy, but research suggests it is not overly common in these programs. Furthermore, pedagogical philosophy is not a single trait but engenders "an alignment between the needs of the learner, the desired learning outcomes and the tasks and activities designed by the teacher to achieve those outcomes" (Mortimore, 1999, p. 220) that recognizes the need for connection between "theoretical and practical knowledge" (p. 223) that both the teacher in training and their future students bring to the classroom. Through meaningful opportunities to explore their own philosophical components, pre-service teachers will be able to better develop their pedagogy and choose methodologies that align well with their own unique worldviews, choosing from best practices they need to receive through their Deaf Education specific coursework. Of course, many teachers enter Deaf Education programs, which tend to be graduate programs, with some degree of education familiarity through undergraduate degrees, but this is not always the case and recent trends show a decline in traditional teachers entering Deaf Education, as was seen in the participants in the survey, 18.3% of whom did not come from any teaching background and 10% had degrees in non-education communicative disorders and speech education.

Another area of implication for teacher training programs is the need for Deaf Education programs to educate pre-service teachers about the Common Core State Standards and also

prepare students to work with students who may not yet be capable of achieving the full Common Core due to language delays and other factors, a situation that appears to cross the communication philosophy lines in Deaf Education. Even teachers who were in their first year of teaching reported that they did not receive training in the Common Core and are now in classrooms where they must teach the Common Core, not only in English Language Arts and mathematics times, but across all subjects for English literacy and mathematical literacy (see the Common Core State Standards for English language arts and literacy in history/social studies, science, and technical subjects).

Deaf Education. Several survey participants and most of the interview participants spoke of the need for a change in the Common Core standards, led by Deaf Education, to create a leveled step of standards from the Common Core State Standards. As Bria said in her interview, "I hope that Deaf Education will develop their own Common Core that is separate but aligns with the hearing Common Core. There are many things in the Common Core that don't apply to our school." This leveled set of standards would allow for teachers to focus on fundamentals for students who have language delays and to use the full Common Core for students who do not have the same kinds of delays. The concept is similar to New Mexico's Expanded Grand Band Expectations (New Mexico Public Education Department, 2012) or Utah's Essential Elements (Dynamic Learning Maps, 2017), however, these two examples are for use with students who cannot *cognitively* achieve at the level or rigor of the Common Core, while D/HH students face a different challenge of not being able to *linguistically* achieve at the level of rigor of the Common Core. Of course, there is no single entity that holds the title of "Deaf Education", but the amalgamation of entities, communities, philosophies, organizations, and peoples that make up "Deaf Education" do create change within the field, in the same way that the Common Core had a few driving

individuals but was created by the cooperative efforts of several groups. An example in Deaf Education of this collaborative effort is the recent introduction of the Common Core aligned K-12 ASL Content Standards (Laurent Clerc National Deaf Education Center, 2017). I recommend that the field of Deaf Education in a larger sense take on the work of creating a set of national standards rather than single entity (Deaf school, state, higher education institution, or Deaf Education related organization) as the phenomenon of the Common Core has had broader impact than what would be adequately represented by a single entity. This could be done in much the same as the national ASL standards with an organization leading the way but seeking input from as many stakeholders as possible. A nationwide, transparent discussion on the standards would keep the appropriate rigor of the standards while addressing the needs of D/HH from various backgrounds, needs, and communication modalities by eliciting a wider array of input from a better sample of stakeholders.

Another implication from this study for the field of Deaf Education is the question, "Is pedagogy only about language?" Language is, and most likely will always be, the central issue of Deaf Education (Hult & Compton, 2012), but pedagogy is a multi-faceted thing (Alexander, 2004; Ax & Ponte, 2008; Bloom, 1956; Ford & Profetto-McGrath, 1994; Freire, 2000; Grosjean, 1996; Hermann-Shores, 2017; Mortimore, 1999) and merely choosing a communication philosophy does not provide a teacher, pre- or in-service, with a complete pre-packaged set of pedagogical philosophy and methodology, although it does inform both. National discussions should address the issues of language philosophy, but they must also discuss *all* philosophies that are being brought to Deaf classrooms by practitioners (both educators and administrators), policy makers, and researchers in addition to the various methodologies employed in Deaf Education and the related fields of ELL education, special education, and general education. This is

especially true in light of the updated expectations for teaching and learning from the Common Core State Standards Initiative, within which many Deaf schools and programs must achieve.

Recommendations for Future Research

In contemplating future research that needs to relate to themes and questions from this study, the first area of future research comes from the delimitations of this study. I chose to specifically focus on the Common Core State Standards in mathematics and only at the elementary level. Many participants mentioned the English Language Arts standards and practices in their comments, but that area was not explored within this study. Also, I chose elementary teachers as I believed that is where the impact of the Common Core was most felt, but that does not mean that secondary teachers of the D/HH have not also experienced a pedagogical impact from the Common Core. More studies need to be conducted in these areas.

Pedagogy has been the underlying framework of this study. In Deaf Education, though, discussions of pedagogy nearly always take the form of research and discussions on communication philosophy and the methodological constraints imposed by the given philosophy rather than more broad thinking about pedagogy (Bahan, 1986; Berg et al., 1996; Cannon & Luckner, 2016; Dodd & Scheetz, 2003; Marschark, 2014; Marschark & Hauser, 2012; National Association of the Deaf, 2016; Nomeland & Nomeland, 2012; Redding, 1997; Senghas & Monaghan, 2002; Smith & Wolfe, 2016; Spencer & Marschark, 2010; World Federation of the Deaf, 2016). There are a few notable exceptions in the literature that focus more on pedagogy rather than the more communication-based discussion mentioned, which mostly center on mathematics rather than other content areas (Benedict, Rivera, & Antia, 2015; Easterbrooks & Stephenson, 2006; Kelley-King, 2016; R. R. Kelly et al., 2003; Lange et al., 2013; Pagliaro, 1998; Pagliaro & Ansell, 2002). Given that the communication philosophy discussion focuses on

a single aspect of teaching philosophy while missing the greater depth of teacher thinking, the methodological studies focus on only one or two aspects of teachers practice while missing the larger view of how teachers of the D/HH use their teaching time, and very few articles link the philosophy and methodology of teaching into a whole *pedagogiek* (Ax & Ponte, 2008), these all need to be studied further. Adding to this, I have discussed the four types of pedagogies and the existence of all four within the study's sample, further research should review the types of pedagogies and where, how much, and how often they are found within Deaf Education to assist in developing a stronger teaching field. Additionally, I have made a strong assertion in stating that Deaf Education has a "salvation mindset" based on a mixture of historical religious foundation, cultural-linguistic identity, and the unique special education setting of Deaf Education. This thought could stand more scrutiny and research, especially of a qualitative nature.

The Common Core and its intersection with Deaf Education also needs further research to probe the unique and, hitherto, unexplored intersection of educational aspects. In reviewing the literature, I have not been able to find more than a single scholarly work (Costner, 2013) discussing the Common Core and Deaf Education. Given the widespread impact of the Common Core and the cross-communication philosophy findings of this study, this an area that deserves greater illumination, to benefit the teachers who must teach within these realities daily.

Concluding Thoughts

The Deaf poet, Ella Mae Lentz (2006), wrote a poem, first in ASL and then poetically translated to English, that describes the relationship between a hearing mother of a deaf child and the Deaf community,

You and I, we are so different…

Worlds apart, languages disparate, experiences unequal…

You grew up knowing nothing about Deaf people & our lives

While I grew up knowing too well the injustices by hearing people…

And now you give birth to a boy!

And he's Deaf!

You are shocked and desperate…

While I am surprised and delighted…

Determinedly, you raise him to be like you…

Impressive.

However, inside him, he shall be like me.

His hair, eyes and body are so much like yours…

However, his soul, mind and heart shall be much like mine.

He is your son…

But, he is of our people.

To whom then does the boy belong?

Well, he is like a tree…

Who will he be, we don't know.

Without us, he shall be alone and empty, however, without you the ground shall be forever barren…

And our wonderful people, our wonderful language shall dwindle.

We struggle about him, like a two-man saw, sawing, sawing until he falls

No! We do not want that to happen!

Will you take my hand, and come join me and become a doubly fertile ground for him to grow strong, smart and beautiful!

Yes?

Visit http://bit.ly/LentzPoem-NHDissertation to view the poem in its original ASL. This link is a 2010 performance by the poet on her YouTube channel.

One of the messages of this poem is that the strength of D/HH children comes from the uniting of their family and the Deaf community. In light of this study, I want to re-interpret the message of the poem. The Common Core and Deaf Education do not have the greatest relationship, as seen through the pedagogical eyes of the teachers who participated in this study. However, I believe that through the purposeful union of Deaf Education and the Common Core using pedagogy as praxis, Deaf schools will be able to provide a "doubly fertile ground" for D/HH students to "grow strong, smart, and beautiful" as these students thrive academically and culturally.

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Appendix A

Objectives, Items, and Questionnaire for Quantitative Phase

Objectives

Objective 1: Understand the demographics of the sample.

Sub-objectives:

1. Understand the teacher demographics.
2. Understand the school demographics.
3. Understand the education/training demographics.

Objective 2: Understand what the sample thinks/feels about teaching, mathematics, and the Common Core.

Sub-objectives:

1. Understand what teachers think/feel about teaching in general.
2. Understand what teachers think/feel about teaching mathematics.
3. Understand what teachers think/feel about the Common Core.
4. Understand what teachers think/feel about the Common Core and Deaf Education.

Objective 3: Understand how the sample teaches mathematics using the Common Core.

Sub-objectives:

1. Understand what teaching approaches are used to teach mathematics.
2. Understand the teacher's perceptions of using the Common Core in teaching.
3. Understand the teacher's perceptions of standardized testing in the classroom.

Instrument showing Items

Informed Consent Letter

As part of ethical research and as part of the approval of this research study, this letter explains the purpose of the study and how I will protect you in how I do my research. You have the option of moving forward to the survey or choosing not to participate at any time.

The Pedagogical Impacts of the Common Core State Standards on Elementary Mathematics Teachers of the Deaf and Hard-of-hearing

Informed Consent for Survey of Elementary Mathematics Teachers

March 8, 2017

Nathan Harrison, from the Educational Leadership Doctoral Program at the University of New Mexico is conducting a research study under the guidance of Dr. Allison Borden. The purpose of the research is to understand how the Common Core has impacted teachers of the Deaf/Hard-of-hearing in what they think about and do for teaching in their classrooms. You are being asked to participate in this study because you are an elementary mathematics teacher at a Deaf School.

Your participation will involve answering multiple choice questions and providing comments about who you are as a teacher, your beliefs about teaching, and your methodology of teaching. The survey should take about 15-30 minutes to complete, and you may choose a private place to take part in this survey. Your involvement in the study is voluntary, and you may choose not to participate. You can refuse to answer any of the questions at any time. There are no names or identifying information associated with your responses. There are no known risks in this study, but some individuals may experience discomfort or loss of privacy when answering questions. Data will be securely kept without identifiable information and may be shared with members of the dissertation committee.

To thank you for your participation in this study, you may choose to participate in a drawing for one of four $20 gift cards. The drawing will be held May 10, 2017, randomly drawing from the information you may choose to provide. To enter, you may 1) use the link at the end of the survey to provide contact information separate from your anonymous responses in this survey or 2) you may email your contact information to Nathan Harrison at nateharrison@unm.edu with “Survey Drawing” in the subject line. Winners will be notified using the email address they provide. Odds in winning depend on total number of participants who want to enter the drawing.

The findings from this project will provide information on the impact that the Common Core has had on teachers of the Deaf/Hard-of-hearing and their pedagogy. If published, results will be presented in summary form only.

This research study includes follow-up interviews to this survey. If you would be interested in being part of a 15-30 minute interview about the content and results of this survey, you may 1) use the link at the end of the survey to provide contact information separate from your anonymous responses in this survey or 2) you may email your contact information to Nathan Harrison at nateharrison@unm.edu with “Interview” in the subject line.

If you have any questions about this research project, please feel free to contact Nathan Harrison at nateharrison@unm.edu. If you have questions regarding your rights as a research subject, or about what you should do in case of any harm to you, you may call the UNM Office of the IRB (OIRB) at (505) 277-2644 or irb.unm.edu.

By clicking “I Agree” below you will be agreeing to participate in the above described research study.

I have read the informed consent letter and wish to participate in the survey.

- ◯ I Agree
- ◯ I Do Not Wish to Participate

Decline to Participate

Thank you for your consideration. You may close this window now.

Sometimes people change their mind and wish to participate, if you do so the link for this survey will remain active until May 1, 2017.

Demographics

This section asks questions about who you are, your training and experience, and the school in which you work. These questions will not collect information that could make it possible to identify you.

What grade(s) do you teach? (Choose all that apply for mathematics)

- [ ] K
- [ ] 1
- [ ] 2
- [ ] 3
- [ ] 4
- [ ] 5
- [ ] 6

How many years have you been teaching?

How would you identify your hearing status based on a cultural perspective?

How do you identify your gender?

What is your level of American Sign Language (ASL) proficiency? Please clickHERE (Gallaudet) or HERE (NTID) for more exact definitions of levels.

What is the highest educational degree you have earned?

Please list your degree(s), beginning with lowest to highest degree.
Example: Psychology (Bachelor's) and Special Education (Master's).

Demographics (continued)

Regions of the USA for Deaf Education

In which region of the country is your school located? Please click HERE (Gallaudet) for more information.

Which communication philosophy best describes your school?

How closely does your school follow the Common Core State Standards?

Not At All	Not Closely	Partially	Closely	Very Closely
○	○	○	○	○

Which of these trainings/learning opportunities have you received specifically for the Common Core and/or teaching mathematics? (Check All That Apply)

	Mathematics Teaching	Common Core
Formal Education (such as college courses)	☐	☐
In-School Professional Development	☐	☐
Out-of-school Trainings	☐	☐
Self-Study (not required by your school)	☐	☐

Beliefs about Teaching and the Common Core

This section asks you to think about your beliefs, feelings, philosophy of teaching, Deaf Education, and the Common Core.

Please choose the answer on the scale that best matches how you feel**about teaching in general**.

	Strongly Disagree	Disagree	Agree	Strongly Agree
I enjoy teaching	○	○	○	○
I plan to stay in education for the rest of my career	○	○	○	○
I feel stressed about teaching	○	○	○	○
I would rather teach Deaf/Hard-of-hearing students than hearing students	○	○	○	○
Teaching is my dream job	○	○	○	○
Teaching is fulfilling	○	○	○	○
Teaching Deaf/Hard-of-hearing students is rewarding	○	○	○	○

Please choose the answer on the scale that best matches how you feel**about teaching mathematics**.

	Strongly Disagree	Disagree	Agree	Strongly Agree
I understand mathematics	○	○	○	○
I enjoy teaching mathematics	○	○	○	○
Mathematics is my favorite subject to teach	○	○	○	○
Deaf/hard-of-hearing students do well in mathematics	○	○	○	○
My textbook is a good resource for teaching mathematics	○	○	○	○

Beliefs about Teaching and the Common Core (continued)

Please choose the answer on the scale that best matches how you feel about each statement about the Common Core.

	Strongly Disagree	Disagree	Agree	Strongly Agree
I understand the Common Core	○	○	○	○
I enjoy teaching using the Common Core	○	○	○	○
I understand the Standards for Mathematical Content	○	○	○	○
I understand the eight Mathematical Practices	○	○	○	○
The Common Core helps me teach better	○	○	○	○
If given the choice, I would eliminate the Common Core	○	○	○	○
The Common Core is helping my students think more critically	○	○	○	○
The Common Core makes teaching mathematics more stressful	○	○	○	○
The Common Core limits my flexibility as a teacher	○	○	○	○

Please choose the answer on the scale that best matches how you feel about each statement about the Common Core.

	Strongly Disagree	Disagree	Agree	Strongly Agree
The Common Core helps students succeed	◯	◯	◯	◯
The Common Core is important for elementary students	◯	◯	◯	◯
The Common Core is important for secondary students	◯	◯	◯	◯
My mathematics textbook is aligned to the Common Core	◯	◯	◯	◯

Beliefs about Teaching and the Common Core (continued)

Please choose the answer on the scale that best matches how you feel about each statement about the Common Core specific to Deaf Education.

	Strongly Disagree	Disagree	Agree	Strongly Agree
The Common Core meets the language needs of Deaf/Hard-of-hearing students	○	○	○	○
I use the Common Core in my math teaching	○	○	○	○
The Common Core was designed with the needs of Deaf/Hard-of-hearing students in mind	○	○	○	○
The majority of my students have the language ability to succeed with the Common Core	○	○	○	○
The majority of my students have the cognitive ability to succeed with the Common Core	○	○	○	○
The Common Core should remain in Deaf Schools	○	○	○	○

Are there any additional comments you would like to share about your teaching, the Common Core, and/or Deaf Education?

Methodology Used in Teaching and Teaching the Common Core

This section asks you to think about the methods, practices, and activities that make up your classroom teaching and asks questions relating those methodologies to Deaf Education and the Common Core.

How many days a week do you teach mathematics?

How many hours do you teach mathematics each of those days?

How many of those days do you use a textbook to guide your instruction?

How many of those days do you consider that you are using the Common Core?

Think of a typical week of teaching. Please fill in the following table with the percent of your mathematics time that you spend on each of these activities. Please remember the total should add up to 100%.

Direct Instruction	
Hands-on Learning	
Homework/Practice Assignments	
Classroom Assessment (tests, quizzes, etc)	
Standardized Test Practice/Standardized Tests	
Other	

Methodology Used in Teaching and Teaching the Common Core (continued)

Thinking specifically about mathematics teaching, please indicate how often you do the following:

	Never	Seldom	Sometimes	Often	Almost Always
use the school's math program/ textbook	○	○	○	○	○
use multiple textbooks/ programs	○	○	○	○	○
use internet resources	○	○	○	○	○
use pre-made materials	○	○	○	○	○
use materials that you make	○	○	○	○	○
assign students homework	○	○	○	○	○
use direct instruction	○	○	○	○	○
use hands-on learning	○	○	○	○	○
deal with behavior issues instead of teaching	○	○	○	○	○
teach remedial skills to your students	○	○	○	○	○

Thinking specifically about mathematics teaching, please indicate how often you do the following:

	Never	Seldom	Sometimes	Often	Almost Always
use a Common Core labeled textbook/ program	○	○	○	○	○
plan lessons with the Common Core in mind	○	○	○	○	○
use the eight Mathematical Practices in your lessons	○	○	○	○	○
connect Mathematical Practices to Mathematical content in my lessons	○	○	○	○	○
align units to the Common Core	○	○	○	○	○

Methodology Used in Teaching and Teaching the Common Core (continued)

Thinking specifically about mathematics teaching, please indicate how often you do the following:

	Never	Seldom	Sometimes	Often	Almost Always
I teach all the Common Core standards by the end of the year	○	○	○	○	○

Thinking specifically about mathematics, please indicate how often these activities occur in your classroom:

	Never	Seldom	Sometimes	Often	Almost Always
planning activities and/or lessons that prepare students for standardized testing	○	○	○	○	○
students receive testing accommodations during standardized testing	○	○	○	○	○
students pass the standardized tests for math	○	○	○	○	○

Are there any additional comments you would like to make about how you teach the Common Core?

Are there additional comments you would like to make about teaching mathematics in a Deaf Education setting?

Thank You!

Thank you for your participation in this survey! Your responses will help the field of Deaf Education better understand how the Common Core is impacting the elementary math teachers who work with deaf/hard-of-hearing students.

A drawing will be held for one of four $20 gift cards, as a thank you for participants in this survey. If you would like to participate in the drawing, please click on "Yes" below. You will then be taken to another survey to enter contact information. This is to ensure your anonymity and the answers you've provided in this survey.

I will be conducting follow up interviews with a random selection of a few willing participants. These interviews will be 15-30 minutes and will be conducted in the language of your choice (ASL or English). If you are interested in participating in a follow up interview, please click "Yes" below. You will then be taken to another survey to enter contact information. This is to ensure your anonymity and the answers you've provided in this survey.

If you do not wish to participate in the drawing and/or the follow-up interviews, select "No" below.

You can also express your interest by emailing Nathan Harrison at nateharrison@unm.edu and putting "Drawing" and/or "Interview" in the subject line.

Thank you.

Would you like to participate in the drawing and/or be willing to take part in the follow-up interviews?

- ◯ Yes
- ◯ No

Appendix B

IRB Approval and Letters of Informed Consent

UNM | Office of the Institutional Review Board

DATE: March 13, 2017

REFERENCE #: 04117
PROJECT ID & TITLE: [1033625-1] Pedagogical Impacts of the Common Core State Standards on Elementary Mathematics Teachers of the Deaf and Hard-of-hearing
PI OF RECORD: Allison Borden
SUBMISSION TYPE: New Project

BOARD DECISION: DETERMINATION OF EXEMPT
EFFECTIVE DATE: March 13, 2017
REVIEW CATEGORY: Exempt category 2 & 7

DOCUMENTS:

- Advertisement - Survey Invitation (UPDATED: 02/21/2017)
- Advertisement - Recruitment (UPDATED: 03/8/2017)
- Application Form - Project Information (UPDATED: 02/21/2017)
- Consent Form - Consent Survey (UPDATED: 03/8/2017)
- Consent Form - Consent Interview (UPDATED: 03/8/2017)
- CV/Resume - CV Harrison (UPDATED: 02/21/2017)
- Data Collection - Interview Questions (UPDATED: 02/21/2017)
- Other - Project Team (UPDATED: 02/21/2017)
- Other - Dissertation Approval form (UPDATED: 02/21/2017)
- Other - Dept Review (UPDATED: 02/21/2017)
- Protocol - Protocol (UPDATED: 03/8/2017)
- Questionnaire/Survey - Survey Instrument (UPDATED: 03/8/2017)
- Training/Certification - CITI Harrison (UPDATED: 02/21/2017)

Thank you for your New Project submission. The UNM IRB has determined that this project is EXEMPT from IRB oversight according to federal regulations. Because it has been granted exemption, this research project is not subject to continuing review. It is the responsibility of the researcher(s) to conduct this project in an ethical manner.

If Informed Consent is being obtained, use only approved consent document(s).

This determination applies only to the activities described in the submission and does not apply should any changes be made to this project. If changes are being considered, it is the responsibility of the Principal Investigator to submit an amendment to this project for IRB review and receive IRB approval prior to implementing the changes. A change in the research may disqualify this research from the current review category.

The Office of the IRB can be contacted through: mail at MSC02 1665, 1 University of New Mexico, Albuquerque, NM 87131-0001; phone at 505.277.2644; email at irbmaincampus@unm.edu; or in-person at 1805 Sigma Chi Rd. NE, Albuquerque, NM 87106. You can also visit the OIRB website at irb.unm.edu.

The Pedagogical Impacts of the Common Core State Standards on Elementary Mathematics Teachers of the Deaf and Hard-of-hearing
Informed Consent for Survey of Elementary Mathematics Teachers

February 13, 2017

Nathan Harrison, from the Educational Leadership Doctoral Program at the University of New Mexico is conducting a research study under the guidance of Dr. Allison Borden. The purpose of the research is to understand how the Common Core has impacted teachers of the Deaf/Hard-of-hearing in what they think about and do for teaching in their classrooms. You are being asked to participate in this study because you are an elementary mathematics teacher at a Deaf School.

Your participation will involve answering multiple choice questions and providing comments about who you are as a teacher, your beliefs about teaching, and your methodology of teaching. The survey should take about 15-30 minutes to complete, and you may choose a private place to take part in this survey. Your involvement in the study is voluntary, and you may choose not to participate. You can refuse to answer any of the questions at any time. There are no names or identifying information associated with your responses. There are no known risks in this study, but some individuals may experience discomfort or loss of privacy when answering questions. Data will be securely kept without identifiable information and may be shared with members of the dissertation committee.

To thank you for your participation in this study. You may choose to participate in a drawing for one of four, $20 gift cards. The drawing will be held May 10, 2017, randomly drawing from the information you may choose to provide. To enter, you may 1) use the link at the end of the survey to provide contact information separate from your anonymous responses in this survey or 2) you may email your contact information to Nathan Harrison at nateharrison@unm.edu with “Survey Drawing” in the subject line. Winners will be notified using the email address they provide. Odds of winning depend on total number of participants who want to enter the drawing. The findings from this project will provide information on the impact that the Common Core has had on teachers of the Deaf/Hard-of-hearing and their pedagogy. If published, results will be presented in summary form only.

This research study includes follow-up interviews to this survey. If you would be interested in taking part in a 15-30 minute interview about the content and results of this survey, you may 1) use the link at the end of the survey to provide contact information separate from your anonymous responses in this survey or 2) you may email your contact information to Nathan Harrison at nateharrison@unm.edu with “Interview” in the subject line.

If you have any questions about this research project, please feel free to contact Nathan Harrison at nateharrison@unm.edu. If you have questions regarding your rights as a research subject, or about what you should do in case of any harm to you, you may contact the UNM Office of the IRB (OIRB) at (505) 277-2644 or irb.unm.edu.

By clicking “I Agree” below you will be agreeing to participate in the above described research study.

Number: 04117
Version: 3/8/2017
Approved: 3/13/2017
Expires: EXEMPT

Institutional Review Board

The Pedagogical Impacts of the Common Core State Standards on Elementary Mathematics Teachers of the Deaf and Hard-of-hearing
Informed Consent for Interview

February 13, 2017

Nathan Harrison, from the Educational Leadership Doctoral Program at the University of New Mexico is conducting a research study, under the guidance of Dr. Allison Borden. The purpose of the research is to understand how the Common Core has impacted teachers of the Deaf/Hard-of-hearing in what they think about and do for teaching in their classrooms. You are being asked to participate in this interview portion of the study because you are an elementary mathematics teacher at a Deaf School, participated in the initial electronic survey, volunteered to participate in a follow-up interview, and were randomly selected.

Your participation will involve a video recording of an interview in the language of your choice, English or American Sign Language. The interview should take about 30 minutes to complete. The interview includes questions such as your experiences with the Common Core, your experiences with Deaf Education, and your experiences combining the Common Core and Deaf Education. Your involvement in the study is voluntary, and you may choose not to participate. You can refuse to answer any of the questions at any time. Although you will be video recorded for translation and/or transcription purposes, pseudonyms will be used in the study and only the researcher, qualified support personnel, and/or certified interpreters will have access to the video. You will have the opportunity to review the translation/transcription of your interview before it is used for analysis. There are no known risks in this study, but some individuals may experience discomfort or loss of privacy when answering questions. Video recordings will be kept safe without identifiable information until the conclusion of this study then they will be destroyed; transcripts of interviews, without any identifiable information, will be securely kept. The findings from this project will provide information on the impact that the Common Core has had on teachers of the Deaf/Hard-of-hearing and their pedagogy. If published, results will be presented in summary form only and any quotes will use a pseudonym with only minimal information about the participant (classroom grade, hearing status, and/or region of the country). To thank you for your participation in this study. You will be given a $20 gift card after your interview.

If you have any questions about this research project, please feel free to contact Nathan Harrison at nateharrison@unm.edu. If you have questions regarding your rights as a research subject, or about what you should do in case of any harm to you, you may contact the UNM Office of the IRB (OIRB) at (505) 277-2644 or irb.unm.edu.

By digitally signing below you will be agreeing to participate in the above described research study.

Name of Adult Participant	Signature of Adult Participant	Date
Nathan E. Harrison Name of Research Team Member	Signature of Research Team Member	Date

Number: 04117
Version: 3/8/2017
Approved: 3/13/2017
Expires: EXEMPT
Institutional Review Board

Appendix C

Interview Protocol for Qualitative Phase

Question	Pedagogical Aspect Measured
To you, what is the Common Core?	Philosophy (primary), Methodology (secondary)
Has the Common Core influenced how you teach? If so, how?	Methodology
Has the Common Core influenced how you think about teaching? If so, how?	Philosophy
What do you think are the strengths and weaknesses of the Common Core both in general and for Deaf Education?	Philosophy (primary), Methodology (secondary)
What challenges does the Common Core present in teaching deaf/hard-of-hearing students?	Methodology (primary), Philosophy (secondary)
What do you think is the future of the Common Core, especially for Deaf Education?	Philosophy
What would you change in the Common Core to better meet the needs of deaf/hard-of-hearing students?	Methodology
What is the role of pre-made materials (textbooks, worksheets, tests, etc.) under the new Common Core?	Methodology
How has your teaching of the Common Core impacted your students?	Philosophy
Please share any additional thoughts you have pertaining to the Common Core in Deaf Education.	Philosophy/Methodology

Appendix D
Codebook for Quantitative Data

Dataset	**Deaf Education Common Core Mathematics Pedagogy**
Overview	**A survey of pedagogy (philosophy and methodology) under the Common Core for teachers of the deaf/hard-of-hearing who work in Deaf Schools in Common Core states.**
Source	**Nationwide survey of teachers of the deaf/hard-of-hearing sent to 87 deaf schools in Common Core states April 2017.**
Sample Size	60
Updated	*02 October 2017*

Structure of the Dataset

Col. #	**Variable Name**	**Variable Description**	**Variable Metric/Labels** *Note: Categorical variables need to have labels for the categories*
1	**ID**	Anonymous participant identification number	Two-digit number
2	**TEACHK**	Does the participant teach kindergarten?	0=no 1=yes
3	**TEACH1**	Does the participant teach 1st Grade?	0=no 1=yes
4	**TEACH2**	Does the participant teach 2nd Grade?	0=no 1=yes
5	**TEACH3**	Does the participant teach 3rd Grade?	0=no 1=yes
6	**TEACH4**	Does the participant teach 4th Grade?	0=no 1=yes
7	**TEACH5**	Does the participant teach 5th Grade?	0=no 1=yes
8	**TEACH6**	Does the participant teach 6th Grade?	0=no 1=yes
9	**TEACHMANY**	Does the participant teach more than one grade?	Numeric total adding TEACHK – TEACH6
10	**YEARS**	How many years have you been teaching?	Years
11	**HEARING**	How would you identify your hearing status based on a cultural perspective?	0=Deaf 1=Hard-of-Hearing 2=Hearing
12	**GENDER**	How do you identify your gender?	0=Male 1=Female

13	**ASLLEVEL**	What is your level of American Sign Language (ASL) proficiency?	0=Non-user of ASL 1= Satisfy basic communication needs in ASL (Novice) 2= Satisfy routine social demands and basic work demands in ASL (Survival) 3= Able to communicate in most ASL situations with sufficient accuracy (Intermediate) 4= Use ASL fluently and accurately (Advanced) 5= Sophisticated native signer (Superior)
14	**DEGREE**	What is the highest educational degree you have earned?	0= HS Diploma/GED 1= Associates 2= Bachelors 3= Masters 4= Specialist 5= Doctorate
15	**BA**	What is the participants Bachelor's degree in?	1= Deaf Education 2= Education 3= Special Education 4= Non-education 5=Non-education Communicative Disorders and/or Speech
16	**MA**	What is the participants Master's degree in?	1= Deaf Education 2= Education 3= Special Education 4= Non-education 5=Non-education Communicative Disorders and/or Speech
17	**DEAFED**	Are both the Bachelor's and Master's degrees of the participant in Deaf Education?	0=No 1=Yes
18	**REGION**	In which region of the country is your school located? (Gallaudet University Regions 2016-2017)	0= East 1= Midwest 2= South 3= West
19	**COMPHIL**	Which communication philosophy best describes your school?	0= ASL/English 1= Total Communication 2= Listening & Spoken Language
20	**FOLLOWCC**	How closely does your school follow the Common Core State Standards?	0= Not at all 1= Not closely 2= Partially 3= Closely 4= Very Closely

21	**MATHFORMALTRAIN**	Which of these trainings/learning opportunities have you received specifically for teaching mathematics? Formal Education (such as college courses)	0=no 1=yes
22	**CCSSFORMALTRAIN**	Which of these trainings/learning opportunities have you received specifically for the Common Core? Formal Education (such as college courses)	0=no 1=yes
23	**MATHPD**	Which of these trainings/learning opportunities have you received specifically for teaching mathematics? In-School Professional Development	0=no 1=yes
24	**CCSSPD**	Which of these trainings/learning opportunities have you received specifically for the Common Core? In-School Professional Development	0=no 1=yes
25	**MATHOUTPD**	Which of these trainings/learning opportunities have you received specifically for teaching mathematics? Out-of-school Trainings	0=no 1=yes
26	**CCSSOUTPD**	Which of these trainings/learning opportunities have you received specifically for the Common Core? Out-of-school Trainings	0=no 1=yes
27	**MATHSELFSTUDY**	Which of these trainings/learning opportunities have you received specifically for teaching mathematics? Self-Study (not required by your school)	0=no 1=yes

28	**CCSSSELFSTUDY**	Which of these trainings/learning opportunities have you received specifically for the Common? Self-Study (not required by your school)	0=no 1=yes
29	**MATHTRAIN**	Combined training total for mathematics	Numeric total of mathematics specific trainings
30	**CCSSTRAIN**	Combined training total for the Common Core	Numeric total of Common Core specific trainings
31	**ENJOYTEACH**	I enjoy teaching	0= strongly disagree 1= disagree 2= agree 3= strongly agree
32	**STAYTEACH**	I plan to stay in education for the rest of my career	0= strongly disagree 1= disagree 2= agree 3= strongly agree
33	**STRESSTEACH**	I feel stressed about teaching	0= strongly disagree 1= disagree 2= agree 3= strongly agree
34	**STRESSTEACHRC**	I feel stressed about teaching (recoded)	0=strongly agree 1=agree 2=disagree 3=strongly disagree Reverse code of STRESSTEACH
35	**DHHPREFTEACH**	I would rather teach Deaf/Hard-of-hearing students than hearing students	0= strongly disagree 1= disagree 2= agree 3= strongly agree
36	**DREAMTEACH**	Teaching is my dream job	0= strongly disagree 1= disagree 2= agree 3= strongly agree
37	**FULFILTEACH**	Teaching is fulfilling	0= strongly disagree 1= disagree 2= agree 3= strongly agree
38	**DHHREWDTEACH**	Teaching Deaf/Hard-Of-hearing students is rewarding	0= strongly disagree 1= disagree 2= agree 3= strongly agree
39	**UNDSTMATH**	I understand mathematics	0= strongly disagree 1= disagree 2= agree 3= strongly agree

40	**ENJOYMATH**	I enjoy teaching mathematics	0= strongly disagree 1= disagree 2= agree 3= strongly agree
41	**FAVMATH**	Mathematics is my favorite subject to teach	0= strongly disagree 1= disagree 2= agree 3= strongly agree
42	**DHHWELLMATH**	Deaf/hard-of-hearing students do well in mathematics	0= strongly disagree 1= disagree 2= agree 3= strongly agree
43	**TEXTGDMATH**	My textbook is a good resource for teaching mathematics	0= strongly disagree 1= disagree 2= agree 3= strongly agree
44	**UNDSTCCSS**	I understand the Common Core	0= strongly disagree 1= disagree 2= agree 3= strongly agree
45	**ENJOYCCSS**	I enjoy teaching using the Common Core	0= strongly disagree 1= disagree 2= agree 3= strongly agree
46	**UNDSTSTNDRD**	I understand the Standards for Mathematical Content	0= strongly disagree 1= disagree 2= agree 3= strongly agree
47	**UNDSTMATHPRAC**	I understand the eight Mathematical Practices	0= strongly disagree 1= disagree 2= agree 3= strongly agree
48	**TCHBTTRCCSS**	The Common Core helps me teach better	0= strongly disagree 1= disagree 2= agree 3= strongly agree
49	**ELIMTCCSS**	If given the choice, I would eliminate the Common Core	0= strongly disagree 1= disagree 2= agree 3= strongly agree
50	**ELIMTCCSSRC**	If given the choice, I would eliminate the Common Core (recoded)	0= strongly agree 1=agree 2=disagree 3= strongly disagree Reverse code of ELIMTCCSS
51	**CRITTHINKCCSS**	The Common Core is helping my students think more critically	0= strongly disagree 1= disagree 2= agree 3= strongly agree

52	**STRESSCCSS**	The Common Core makes teaching mathematics more stressful	0= strongly disagree 1= disagree 2= agree 3= strongly agree
53	**LIMITSCCSS**	The Common Core limits my flexibility as a teacher	0= strongly disagree 1= disagree 2= agree 3= strongly agree
54	**LIMITSCCSSRC**	The Common Core limits my flexibility as a teacher (recoded)	0= strongly agree 1=agree 2=disagree 3= strongly disagree Reverse code of LIMITSCCSS
55	**SUCCCCSS**	The Common Core helps students succeed	0= strongly disagree 1= disagree 2= agree 3= strongly agree
56	**IMPRTELECCSS**	The Common Core is important for elementary students	0= strongly disagree 1= disagree 2= agree 3= strongly agree
57	**IMPORTSECCCSS**	The Common Core is important for secondary students	0= strongly disagree 1= disagree 2= agree 3= strongly agree
58	**TEXTCCSS**	My mathematics textbook is aligned to the Common Core	0= strongly disagree 1= disagree 2= agree 3= strongly agree
59	**CCSSBELIEFSTOTAL**	Total score for Common Core beliefs section	Total of 10 questions
60	**CCSSBELIEFSAVG**	Average for Common Core beliefs questions	Average of 10 questions Approximates: 0= strongly disagree 1= disagree 2= agree 3= strongly agree v
61	**DHHLANGCCSS**	The Common Core meets the language needs of Deaf/Hard-of-hearing students	0= strongly disagree 1= disagree 2= agree 3= strongly agree
62	**TEACHCCSS**	I use the Common Core in my math teaching	0= strongly disagree 1= disagree 2= agree 3= strongly agree
63	**DHHINCCSS**	The Common Core was designed with the needs of Deaf/Hard-of-hearing students in mind	0= strongly disagree 1= disagree 2= agree 3= strongly agree

64	**STUDLANGCCSS**	The majority of my students have the language ability to succeed with the Common Core	0= strongly disagree 1= disagree 2= agree 3= strongly agree
65	**STUDCOGCCSS**	The majority of my students have the cognitive ability to succeed with the Common Core	0= strongly disagree 1= disagree 2= agree 3= strongly agree
66	**KEEPCCSS**	The Common Core should remain in Deaf Schools	0= strongly disagree 1= disagree 2= agree 3= strongly agree
67	**STUDSUCCESS**	Combined variable of student success with the CCSS	Total of 6 question
68	**DAYSMATH**	How many days a week do you teach mathematics?	Days per week
69	**HOURSMATH**	How many hours do you teach mathematics each of those days?	Hours per day
70	**DAYSTEXT**	How many of those days do you use a textbook to guide your instruction?	Days per week
71	**DAYSCCSS**	How many of those days do you consider that you are using the Common Core?	Days per week
72	**TIMEDIRECT**	Think of a typical week of teaching. Please fill in the following table with the percent of your mathematics time that you spend on each of these activities. Please remember the total should add up to 100%. -Direct Instruction	Percentage
73	**TIMEHANDSON**	Think of a typical week of teaching. Please fill in the following table with the percent of your mathematics time that you spend on each of these activities. Please remember the total should add up to 100%. -Hands-on Learning	Percentage

74	**TIMEHW**	Think of a typical week of teaching. Please fill in the following table with the percent of your mathematics time that you spend on each of these activities. Please remember the total should add up to 100%. - Homework/Practice Assignments	Percentage
75	**TIMETEST**	Think of a typical week of teaching. Please fill in the following table with the percent of your mathematics time that you spend on each of these activities. Please remember the total should add up to 100%. - Classroom Assessment (tests, quizzes, etc)	Percentage
76	**TIMESTDTEST**	Think of a typical week of teaching. Please fill in the following table with the percent of your mathematics time that you spend on each of these activities. Please remember the total should add up to 100%. - Standardized Test Practice/Standardized Tests	Percentage
77	**TIMEOTHER**	Think of a typical week of teaching. Please fill in the following table with the percent of your mathematics time that you spend on each of these activities. Please remember the total should add up to 100%. - Other	Percentage
78	**USETEXT**	use the school's math program/ textbook	0= never 1= seldom 2= sometimes 3= often 4= almost always

79	**USEMANYTEXT**	use multiple textbooks/ programs	0= never 1= seldom 2= sometimes 3= often 4= almost always
80	**USEINTERNET**	use internet resources	0= never 1= seldom 2= sometimes 3= often 4= almost always
81	**USEPREMADE**	use pre-made materials	0= never 1= seldom 2= sometimes 3= often 4= almost always
82	**USESELFMADE**	use materials that you make	0= never 1= seldom 2= sometimes 3= often 4= almost always
83	**USEHW**	assign students homework	0= never 1= seldom 2= sometimes 3= often 4= almost always
84	**USEDIRECT**	use direct instruction	0= never 1= seldom 2= sometimes 3= often 4= almost always
85	**USEHANDSON**	use hands-on learning	0= never 1= seldom 2= sometimes 3= often 4= almost always
86	**DEALBEHAVE**	deal with behavior issues instead of teaching	0= never 1= seldom 2= sometimes 3= often 4= almost always
87	**DEALBEHAVERC**	deal with behavior issues instead of teaching (recoded)	0= almost always 1= often 2= sometimes 3= seldom 4= never Reverse code of DEALBEHAVE

88	**TEACHREMEDIAL**	teach remedial skills to your students	0= never 1= seldom 2= sometimes 3= often 4= almost always
89	**USECCSSTEXT**	use a Common Core labeled textbook/program	0= never 1= seldom 2= sometimes 3= often 4= almost always
90	**PLANCCSS**	plan lessons with the Common Core in mind	0= never 1= seldom 2= sometimes 3= often 4= almost always
91	**USEMATHPRAC**	use the eight Mathematical Practices in your lessons	0= never 1= seldom 2= sometimes 3= often 4= almost always
92	**PRACANDCONT**	connect Mathematical Practices to Mathematical content in my lessons	0= never 1= seldom 2= sometimes 3= often 4= almost always
93	**ALIGNCCSS**	align units to the Common Core	0= never 1= seldom 2= sometimes 3= often 4= almost always
94	**TEACHALL**	I teach all the Common Core standards by the end of the year	0= never 1= seldom 2= sometimes 3= often 4= almost always
95	**PREPFORTEST**	planning activities and/or lessons that prepare students for standardized testing	0= never 1= seldom 2= sometimes 3= often 4= almost always
96	**TESTACCOM**	students receive testing accommodations during standardized testing	0= never 1= seldom 2= sometimes 3= often 4= almost always
97	**TESTPASS**	students pass the standardized tests for math	0= never 1= seldom 2= sometimes 3= often 4= almost always