Language Acquisition Versus Language Development: An Investigation of Teachers' Beliefs of How English Learners Acquire a Language and How These Beliefs Translate into Practice

Toshiko Mesa Maurizio

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Language Acquisition Versus Language Development: An Investigation of Teachers’ Beliefs of How English Learners Acquire a Language and How These Beliefs Translate into Practice

by

Toshiko Mesa Maurizio

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

Doctor of Education in Learning and Leading Specialty in Neuroeducation

University of Portland School of Education

2018
Language Acquisition Versus Language Development: An Investigation of Teachers’ Beliefs of How English Learners Acquire a Language and How These Beliefs Translate into Practice

by

Toshiko Maurizio

This dissertation is completed as a partial requirement for the Doctor of Education (EdD) degree at the University of Portland in Portland, Oregon.

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Abstract

With the increased demands of the new Common Core State Standards (CCSS), the New Generation Science Standards (NGSS), and the revised English Language Proficiency Standards (ELPs); the traditional approach to teaching English Learners (ELs) needs to shift to align with the expectations of these new standards. Therefore, the researcher engaged in a study to determine how professional development (PD) that supports the new standards impacted beliefs of educators in the district and ultimately, classroom practice. The purpose of this qualitative study was twofold: (1) To determine if the Arwood Neuroeducation Model (ANM) supports the pedagogical shifts recommended by Heritage, Walqui, and Linquanti (2015); and (2) If those district educators with and without a professional background in both the pedagogical shifts and in educating ELs based on the ANM show beliefs about language development and/or language acquisition that are aligned with their classroom practices.

The first part of the study involved reviewing the pedagogical shifts and then aligning each shift to components of ANM to determine which elements of the shifts aligned to the model and which ones were missing. The key finding from this part of the study was that ANM has a place in the Second Language Acquisition (SLA) literature and that the model supports and enhances the pedagogical shifts.
The second part of the study was to investigate educators’ beliefs about language acquisition and development aligned to their classroom practice, which was conducted using a combination of an open and closed-ended survey as well as a classroom visit by an educator with this neuroeducation background with no relationship to the district in which the data was collected. The survey was sent to 500 general educators in a large district such as administrators, school psychologists, speech language pathologists, self-contained teachers, English Language Development (ELD) teachers, and content teachers of which 350 responded. The same survey was sent to eight select ELD teachers. Four of the ELD teachers received professional development or PD on the pedagogical shifts for SLA and on the differences between language development and language acquisition and four of the teachers did not receive any training. The eight ELD teachers were also observed once using an observation tool aligned to ANM. The findings for the second part of the study suggest an alignment between beliefs and practice for the group that received PD but not for the group that did not receive the same PD. The data also suggest that when PD was provided on language acquisition, teachers’ beliefs and classroom practice aligned to the literature on language acquisition. When PD was not provided, the beliefs aligned to the literature on language acquisition but classroom practice aligned to the literature on language development. Also, PD around neuroeducation supported the shift in alignment of practice.

*Keywords: English Learners (ELs), teachers’ beliefs, classroom practice, neuroeducation, Neuro-Semantic Language Learning Theory (NsLLT), professional development, ELD teachers, language acquisition, language development*
Acknowledgements

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Finally, I would like to thank a special professor that I will never forget, Dr. Arwood, who is also my committee chair for shifting both my personal and professional beliefs about how we acquire language. Thank you for your impeccable knowledge, wisdom, expertise, tenacity, forward thinking, and for your encouragement that this work applies and directly influences the students I am most passionate about, our ELs. For this, you will always hold a special place in my heart!
Dedication

This project is dedicated to the many individuals that make me whole. To my students, for inspiring me to become an administrator in order to help change the trajectory of their success. To my aunt whom I call mom, Rose Mesa, for her help with every day house chores and for her patience with my children. To my mom, Jane Mesa, brother, Arnold Mesa, and sister-in-law, Heather Mesa, for their help with caring for and entertaining my children in order to free up my weekends so I could work on this project. To my in-laws, Drs. Don and Gigi Maurizio, for sharing copies of their dissertations with me and for inspiring me to complete this project. To my two children, Matteo and Isabella, for their patience and understanding when they had to spend quality time without their mommy, for their support when I was working late on this project and unable to tuck them in to bed, and for always asking why I was still in school, which led to many laughs and a promise this was the last time their mommy would be in “school.”

Lastly, to my wonderful and amazing husband, Guy Maurizio, for which this project would not have been possible without his love, patience, and sense of humor throughout this journey. Thank you for taking the family on several weekend trips so I could work on this project. Thank you for being so unselfish and for putting me first these past three years. Thank you for your unconditional and incredible love!
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Chapter One

Introduction

As an English Language Development (ELD) teacher, school level administrator, and currently the Administrator for Multilingual Programs overseeing EL programs for the district that is the subject of this study, this researcher has served, over the course of 10 plus years, hundreds of English Learners (ELs) with a wide range of proficiency levels. After over a decade working with ELs, the researcher concluded that education for this subgroup of students had some limitations. There were significant numbers of ELs labeled as long-term ELs, a high percentage of ELs with disabilities, a high percentage of ELs not meeting state English Language Arts (ELA) and math standards, and an influx of newcomer recent arrivers that needed extensive language and social and emotional support. On top of these high needs, there were new language standards aligned to the common core state standards that were more rigorous and challenging. There were also new suggestions made by key researchers in the field of second language acquisition (SLA) to change classroom practices away from the heavy emphasis of developmental cognitivism.

This researcher learned through preservice training as a teacher, and through experience working with ELs, that language development as practiced in the current context of SLA focused on the language products and stage theory. The researcher understood that *language structures* were the surface forms of language such as
words, sentences, morphology, syntax, and semantics (surface) (Chomsky, 1968) and that teaching these structures in a developmental sequence helped students to acquire language to include a second language. The researcher also understood there was a difference between language structures (or language forms) and language function and that language function focused on the purpose for which speech or writing were being used such as in giving instructions, introducing ourselves, or making requests (Dutro & Moran, 2002). Therefore, the field of Second Language Acquisition (SLA) and second language instruction was organized on these grammatical structures and functions, which focused on “an inventory of language units in isolation and abstraction” (Widdowson, 1979, p. 247; Valdés et al., 2011). In trying to find ways to address the limitations of education of ELs, the researcher enrolled in a neuroeducation program. Within this program that connects neuroscience, cognitive psychology, and language function; the researcher learned that there was another definition of language function which refers to the deep thinking and deep semantics acquired by social and cultural processes (Arwood, 2011; Bruner, 1975; Halliday, 1975; Peirce, 1894) as well as by the neurosemantics of connecting a learner through neurobiological experiences to acquiring language (Arwood, 2011; Bookheimer, 2002; Pulvermüller & Schumann, 1994; Pulvermüller, 2017, 2018).

The researcher sought out SLA researchers who might be addressing this shift from developmental structures to acquisition processes. Heritage, Walqui, and Linquanti (2015) made some recommendations for pedagogical shifts to address the demands of the new standards. These pedagogical shifts were about changing classroom practices based on current SLA theories. The literature supporting these
shifts was grounded in cognitivism (Atkinson, 2011). However, the neuroeducation classes were bringing in neuroscience literature as well as literature on how learning for conceptualization or language function occurs. It was at this point when the researcher wondered if the Heritage, Walqui, and Linquanti (2015) pedagogical shifts could assist educators of ELs to change their practices from developmental cognitivism to more of an acquisition process focus as suggested by the neuroeducation literature. Therefore, the researcher sought to determine if adding these other literature lenses of the neuroeducation model would help support the classroom practices or the recommended Heritage, Walqui, and Linquanti (2015) shifts in pedagogy, which lead to the development of this study.

**Statement of the Problem**

If SLA and second language instruction is organized around grammatical forms and functions (Widdowson, 1979, p. 247; Valdés et al., 2011) and heavily influenced by cognitivism (Atkinson, 2011); and, if the pedagogical shifts recommended by Heritage, Walqui, and Linquanti (2015) call for a move away from cognitivism, then one problem is that the current context of SLA may be insufficient in meeting the increased demands placed on ELs. If this is true, then the current paradigm of SLA will need to change. Current literature on language acquisition from a neuroeducation perspective describes language as action (van Lier and Walqui, 2012) where language is viewed as strongly connected to physical, social, and symbolic actions. Literature also suggests that language; particularly the functional use of language mediates thinking and that this thinking is reflective of the deep underlying concepts that are interconnected neurobiologically (Arwood, 1983; Peirce,
1878, 1902; Zeman, 1977). Therefore, an investigation of the alignment between the recommended pedagogical shifts and the literature on language acquisition may provide teachers a different lens and approach to SLA that may change the academic landscape for ELs.

Additionally, if the recommended shifts require a change in classroom practice, another problem is how teachers’ beliefs about how language is acquired or developed impact their classroom practice. If beliefs affect educators’ practice, then could their beliefs change through professional development? Teachers’ beliefs have a profound impact on classroom practice (Crawley & Salyer, 1995; Farrell & Kun, 2008; Farrell & Lim, 2005; Karavas-Doukas, 1996; Richards, Gipe, & Thompson, 1987; Shavelson & Stern, 1981; Tillema, 2000; Zheng, 2009). In their book, Heritage, Walqui, and Linquanti (2015) talk about teachers’ beliefs and impact on classroom practice. They state that while many teachers “think of themselves as practical and removed or uninterested in the theoretical world, in reality they all have theories that consciously or unconsciously guide their teaching” (Heritage, Walqui, & Linquanti, 2015, p. 53). Additionally, they state that “if teachers are going to be successfully engaged in reformulations of practice, they first need to gain awareness of their current theoretical stances and any inherent limitations therein and only then will they be in a position to transform their existing theoretical perspectives and the teaching practices on which they are based” (p. 53). However, the reality is that there exists a disconnect between theory and practice or beliefs and practice (Clark & Peterson, 1986; Duffy, 1982; Duffy & Anderson, 1984; Duffy & Ball, 1986); but, this inconsistency is not unexpected (Fang, 1996). For many years, researchers have noted
how the complexities of the classroom life make it difficult for teachers to deliver instruction that aligns to their theoretical beliefs (Duffy, 1982; Duffy & Anderson, 1984; Duffy & Ball, 1986; Roehler & Duffy, 1991; Paris, Wasik & Turner, 1991). This body of research suggests that other contextual factors such as classroom management, diversity of learners, and new standards can have powerful influences on teachers’ beliefs and therefore affect their classroom practices (Fang, 1996; Ng & Farrell, 2003). Therefore, an investigation of the barriers that influence beliefs and ultimately classroom practice can potentially help teachers make the recommended pedagogical shifts.

**Background of the Study**

Understanding the problems that exist with the current education of ELs, the researcher began to ask critical questions. Are the pedagogical shifts recommended by Heritage, Walqui, and Linquanti (2015) aligned to the neuroeducation literature? What are the barriers for teachers that might prevent them from making the pedagogical shifts? And, if the teachers are provided professional development about these shifts as well as the neuroeducation model do educators’ beliefs align with their practices?

As part of the attempt to improve the education system designed to meet ELs’ needs, and as a district administrator seeking professional development (PD) for her faculty and staff, the researcher sought support to help reduce some of the problems in educating ELs. As part of that support, the researcher in collaboration with Teachers on Special Assignment (TOSAs) along with a consultant hired to help with creating road maps for program models, the department chose to provide Heritage, Walqui, and
Linquanti (2015) books to all ELD teachers in the fall of 2015. This book included recommended pedagogical shifts to keep educators abreast of the demands of the new standards. Additionally, the content of these shifts was woven into some PD provided by department staff. The underlying intention was to introduce staff to the new standards and to start the conversation around changes in practice to address the problems with educating ELs and to provide a shift in pedagogy aligned to the new standards.

From the researcher’s neuroeducation courses, in 2016, the researcher brought information regarding the differences between teaching developmental language structures representing stages and providing learners with language acquisition opportunities (socio-cognitive processes and neurobiological processes) to the district educators, in the form of multiple professional development workshops. The district invited Dr. Bonnie Robb, classroom teacher well versed in the literature around language acquisition and neuroeducation, to deliver a presentation to a small group of teachers and staff. The purpose of these workshops was to introduce Arwood’s Neuroeducation Model (ANM) to see how these educators would receive the new learning. This new approach showed the educators how to shift practice from language developmental products to providing opportunities for language acquisition opportunities. The information was well received; and, therefore, the district decided to continue the PD with a larger group of ELD teachers. In the fall of this same year, the district brought in a key language expert from the University of Portland (UP), Dr. Ellyn Arwood, to provide PD on ANM to 200 ELD and dual language teachers. In the spring of 2017, Dr. Arwood and Dr. Robb presented this same research to a group of
elementary principals. The purpose of the PD was to begin to equip teachers and administrators with the knowledge and skills around language acquisition methods to begin shifting the pedagogical and theoretical constructs away from methods of teaching language learning as developmental products.

However, did the Heritage, Walqui, and Linquanti (2015) recommended pedagogical shifts align with the literature from the three lenses within the neuroeducation courses? And, did the PD result in changes to the educators’ classroom practices that aligned with the neuroeducation literature? Therefore, the researcher developed a study that would utilize ANM for considering whether or not the district educators’ beliefs and practices were aligned with the PD they received. The specific research questions for the study are outlined in the next section and full results of the study will be provided in Chapter Four.

Research Questions

There were five questions developed to address the purposes of the study. The research question developed to address the first part of the study was: Does the literature within the ANM framework support and/or add to the recommended Heritage, Walqui, and Linquanti (2015) pedagogical shifts? The second part of the study was to investigate how theory and beliefs affected classroom practice using the research questions below to guide the study:

1. Do the beliefs of district educators who serve ELs align more to the literature around language acquisition or language development as measured by a survey?
2. How did the beliefs of educators that received neuroeducation professional development differ from those that did not receive professional development as measured by a survey?

3. How did the beliefs of educators who received neuroeducation PD on the methods of language acquisition align with their beliefs about effective instructional methods and their instructional practice when observed a year after the PD as measured by a survey and an observation tool?

4. How did these educators show the same or different sets of beliefs about effective instructional methods aligned to their practice when compared to a group of educators who have not received the same professional development as measured by a survey and an observation tool?

To answer the research questions above, the researcher decided to use a neuroeducation lens as the theoretical framework for the study and showed how neuroeducation could be used in the context of SLA, which is the topic of the next section.

**Theoretical Framework in Neuroeducation**

Neuroeducation is considered an interdisciplinary field that connects the fields of neuroscience, cognitive science, psychology, and education with the main goal of creating a new field of science to transform educational practices. It can be specifically defined as a “broad interdisciplinary and multidimensional field concerning matters pertaining to mind, brain, and education drawing on theories and methods from a range of disciplines and the main goal of the field is to investigate scientific and pedagogic bases of learning and education utilizing a variety of research
methods that are currently used within all the contributing fields” (Nouri & Mehrmohammadi, 2012, p. 1). The field is fairly new and the greatest challenges facing the field are the lack of a common language among researchers and the misinterpreted assertions. However, studies of the brain and mind are critical when they apply to education (Nouri & Mehrmohammadi, 2012). Therefore,

Neuro- and cognitive science researchers must make a sufficient attempt to look from the lab to the classroom whenever it’s clear their work is relevant to education. Significant progress will be made if scientific researchers are willing to step out of the laboratory and collaborate with educations by working in school settings with principals and teachers as co-investigators. In this way, the field of neuroeducation can bring to education the bench to bedside research approach that is common in medicine but rare in educational practice. (Hardiman, Rinne, Gregory, & Yarmolinskaya, 2012, p. 139)

There are many different approaches to neuroeducation as a field. The approach used for the scope of this study comes from the University of Portland (UP), called Arwood’s Neuroeducation Model (ANM). For the purpose of this study, ANM is being used as the neuroeducation model because ANM appears to be the only neuroeducation model that utilizes language as the mediator between the mind (cognitive psychology) and brain (neuroscience) (Arwood, 2011; Robb, 2016). Arwood (2011) developed the UP Model that offers a theory of triangulation among the sciences of neuroscience, cognitive psychology, and language theory to account for the impact of language function on the learning process. The term neuroeducation
will be used in reference to ANM and will serve as the operational definition of neuroeducation that will be used throughout this study.

The ANM provides the basis for understanding the core mechanisms for all learning processes by seamlessly triangulating the literature from the aforementioned disciplines. Figure 1.1 below shows how the three disciplines come together through a three-way Venn diagram in which the shaded area at the center represents the translation and cohesiveness of the three disciplines. At the center of the model is a theory called Neuro-Semantic Language Learning Theory (NsLLT) that serves as the synthesis of the literature from the three fields to explain language acquisition.

![Arwood’s Neuroeducation Model](image)

*Figure 1.1. Arwood’s Neuroeducation Model*

More about ANM and the NsLLT will be discussed in Chapter Two as it relates to EL education. The next few sections will provide an overview of each of three disciplines that make up the ANM as they relate to the application of ANM to EL education.

**Language Function**

Language involves an environment in which people assign multiple meanings and where these meanings become available and possibly change as the student uses
the language in context to the environment (van Lier & Matsuo, 2000). This process through which language is acquired within the context of the environment is referred to as socio-cognitive (Anton & DiCamilla, 1998; Arwood, 2011; Atkinson, Churchill, Nishino, & Okada, 2007; Bühler, 1990; Halliday, 1973) and/or socio-cultural (Donato, 2000; Johnson, 2006; Vygotsky, 1962). But, there are internal neurobiological processes involved in the acquisition of language (Arwood, 2011; Bookheimer, 2002; Pulvermüller & Schumann, 1994; Pulvermüller, 2017, 2018). These neurobiological processes connect the environment to the learner for the acquisition of meaning (Arwood, 1983; 2011; Pulvermüller & Schumann, 1994). Neuro-semantics (Arwood, 2011; Pulvermüller, 2017; 2018) physically create the thinking or language function, a set of physical layers of meaning for conceptual learning. Language function is the foundation for literacy and is predictive of later academic success in young children (Cooper, 2006; Hart, 1995; Hayiou-Thomas, Harlaar, Dale, & Plomin, 2010).

**Neuroscience**

Neuroscience has made strides these past years with new technological advances such as Functional Magnetic Resonance Imaging (fMRI) and Positron Emission Tomography (PET) that allows scientists to understand that the process of learning has a neurobiological function. These imaging techniques allow neuroscientists to study the relationship between tasks and brain activity. New research from this field of science has found evidence linking language function to brain function through interconnected neuro-semantic networks that are activated during language tasks (Gallistel & Matzel, 2013; Göetzmann & Schwegler, 2010; Pulvermüller, 2003, 2005, 2012). This is a shift from earlier research stating language
tasks were completed using specific regions of the brain.

**Cognitive Psychology**

The field of cognitive psychology places heavy emphasis on the child’s mind by measuring perception, attention, motivation, effort, and self-regulation (Anderson, 2010; de Bruin & van Gog, 2012; Finn, Lee, Kraus, & Hudson Kam, 2014; Lucas, Griffiths, Xu, Fawcett, Gopnik, Kushnir, & Hu, 2014). An example of placing heavy emphasis on a child’s mind is assessing student learning by interpreting the outward behavior of students through pre-determined tests designed by teachers used to evaluate learning of content or language or by assessing the grammatical products of students to determine proficiency in the language.

The literature (Chapter Two) from these three disciplines of ANM were used to consider their alignment with the proposed pedagogical shifts by Heritage, Walqui, and Linquanti (2015). Additionally, using any other neuroeducation framework may or may not align to the pedagogical shifts. The researcher selected ANM specifically for this study, as ANM is the only neuroeducation model that incorporates language theory and language function as a mediator between the mind and the brain.

**Overview of Methods**

The methods selected for this study address the research questions described in a previous section. A brief overview of the methods is described below.

*Does the literature within the ANM framework support and/or add to the recommended Heritage, Walqui, and Linquanti (2015) pedagogical shifts?* Heritage, Walqui, and Linquanti (2015) recommended ten shifts, outlined in Table 1.1. The “from” column is the current set of methods and materials used in SLA which the
authors recommend shifting away from and towards the “to” column, which is what the authors recommend educators shift to.

Table 1.1

*Pedagogical Shifts Recommended by Heritage, Walqui, and Linquanti (2015)*

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
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<tbody>
<tr>
<td>Seeing language acquisition as an individual process</td>
<td>Understanding it as a social process of apprenticeship</td>
</tr>
<tr>
<td>Conceptualizing language in terms of structures or functions</td>
<td>Understanding language as action</td>
</tr>
<tr>
<td>Seeing language acquisition as a linear and progressive process aimed at accuracy, fluency, and complexity</td>
<td>Understanding that acquisition occurs in non-linear and complex ways</td>
</tr>
<tr>
<td>Emphasizing discrete structural features of language</td>
<td>Showing how language is purposeful and patterned</td>
</tr>
<tr>
<td>Lessons focused on individual ideas or texts</td>
<td>Cluster of lessons centered on texts that are interconnected by purpose or by theme</td>
</tr>
<tr>
<td>Activities that pre-teach content</td>
<td>Activities that scaffold students’ development and autonomy as learners</td>
</tr>
<tr>
<td>Establishing separate objectives for language and content learning</td>
<td>Establishing objectives that integrate language and content learning</td>
</tr>
<tr>
<td>Using simple or simplified texts</td>
<td>Using complex, amplified texts</td>
</tr>
<tr>
<td>Teaching traditional grammar</td>
<td>Teaching multimodal grammar</td>
</tr>
<tr>
<td>The use of tests designed by others</td>
<td>The use of formative assessment</td>
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Heritage, Walqui, and Linquanti (2015) paint a vivid picture using vignettes of teacher practice describing the current methods used in SLA (“from” column). Therefore, the researcher analyzed (Chapter Two) these ten recommended pedagogical shifts through the literature within the neuroeducation lens. This analysis involved
reviewing the literature of the three disciplines of ANM and determining which of the
shifts aligned well to the literature under each discipline within the ANM. For
example, the first two shifts in Table 1.1 align with the literature on language function
in which peers, adults, community members assign meaning to what a learner or
speaker does (social) resulting in the neurobiological processes of acquiring meaning
(Arwood, 1983; Atkinson, 2011; Bruner, 1975; Carroll, 1964; Dore, 1975; Halliday,
1977; Searle, 1970). The shifts such as scaffolding instruction, understanding that
acquisition occurs in non-linear and complex ways, and clustering lessons align well
with the neuroscience literature indicating that multiple regions of the brain are
activated during language tasks (Gallistel & Matzel, 2013; Götzmann & Schwegler,
2010; Pulvermüller, 2003, 2005, 2012) than originally believed. Lastly, the shifts
such as using traditional grammar, moving away from viewing the discrete structural
features of language, tests designed by others, and pre-teaching content align to the
cognitive psychology literature that places heavy emphasis on the products of learning
by measuring perception, attention, motivation, and language structures (Anderson,
2010; de Bruin & van Gog, 2012; Finn, Lee, Kraus, & Hudson Kam, 2014; Lucas,
Griffiths, Xu, Fawcett, Gopnik, Kushnir, & Hu, 2014). Current research, however,
suggests that teachers of all content areas and language teachers do not have the
sufficient knowledge of language necessary to integrate academic language into their
routine teaching effectively (Gebhard, Chen, Graham, & Gunawam, 2013; Macken-

Although there may be connections with all ten of the shifts and ANM, the
researcher selected three key shifts that strongly align with the literature on language
acquisition from the ANM perspective. The three shifts selected were 1) from seeing language acquisition as an individual process to understanding it as a social process of apprenticeship, 2) from seeing language acquisition as a linear and progressive process aimed at accuracy, fluency, and complexity to understanding that acquisition occurs in non-linear and complex ways, and 3) from implementing activities that pre-teach content to incorporating activities that scaffold students’ development and autonomy as learners. Then, for each of these three shifts, the researcher provided key literature using the neuroeducation lens to determine if there was an alignment between the shifts and ANM and to support a shift in educational practices for ELs. The literature supporting this alignment will be outlined in Chapter Two and a complete description of the methods will be included in Chapter Three of this study. The results and visuals of the alignment to ANM will be included in Chapter Four.

Do the beliefs of district educators who serve ELs align more to the literature around language acquisition or language development as measured by a survey? How did the beliefs of educators that received neuroeducation professional development differ from those that did not receive professional development as measured by a survey? To address these two research questions, the researcher sent out a survey developed through Qualtrics to three different groups of educators. The first group was a general group of 500 educators across the district. The second group was a smaller group of educators that received PD and the third group was a group that did not receive PD. The responses were coded using first and second cycle coding methods and then analyzed based on the frequency of responses.
How did the beliefs of educators who received neuroeducation PD on the methods of language acquisition align with their beliefs about effective instructional methods and their instructional practice when observed a year after the PD as measured by a survey and an observation tool? How did these educators show the same or different sets of beliefs about effective instructional methods aligned to their practice when compared to a group of educators who have not received the same professional development as measured by a survey and an observation tool? To address these questions, the same survey described in the previous section was used. Additionally, the instrument that was used was a classroom observation tool that aligned to the ANM framework. An outside observer used this classroom observation tool to determine whether the teachers that received PD and the teachers that did not receive PD showed an alignment to the literature on language acquisition or development and classroom practice. The frequency of yes and no answers as well as a transcript of the classroom observation were used to answer these research questions. A thorough description of the observation tool and survey is included in Chapter Three.

Overview of Results

Overall, the results for the first research question show an alignment between the three pedagogical shifts recommended by Heritage, Walqui, and Linquanti (2015) and the literature on language acquisition that underlie ANM. There is literature within the three lenses of ANM supporting a shift toward understanding language acquisition as a social process, understanding that acquisition occurs in non-linear ways, and literature on how scaffolding students’ learning is needed for students to acquire
language. The results indicate how ANM and corresponding lenses may be used in the context of SLA and second language instruction practices.

Additionally, the results for the four remaining research questions indicate varied alignment between beliefs and practice. Specifically, for the general group of educations that were surveyed, their beliefs around how language was acquired to include a second language aligned more to the literature on language development. However, for this same group, the beliefs around best instructional methods aligned more to the literature on language acquisition. For the group that received PD, their beliefs and classroom practice aligned more to the literature on language acquisition. For the group that did not receive PD, their beliefs aligned to language acquisition but their classroom practice aligned to the literature on language development. These results indicate that when beliefs and PD are aligned to the literature on language acquisition, specifically ANM, there is a connection to classroom practice. In contrast, when PD is not provided, the alignment leans toward the literature on language development.

**Significance**

There is dire need to improve the education for the fastest growing subgroup in the United States, our English Learners (ELs). This need is reflected in the statistics of overrepresentation of ELs in special education programs (Artiles, Rueda, Salazar, & Higareda, 2005; Collier, 2014; Donovan & Cross, 2002; Harry & Klingner, 2006; Hoover, Baca & Klingner, 2016), academic performance of ELs (Digest of Education Statistics, 2016; Duran, 2008; Migrant Policy Institute, 2015; Oregon Department of Education, 2015), which is among the lowest performing subgroups, and the time it
takes ELs to gain English proficiency and exit programs designed to meet their language needs (Klingner & Eppolito, 2014; Menken & Kleyn, 2010; New York Department of Education, 2013; Olsen, 2010; WestEd, 2016).

The significance of this research to the field of SLA and to the instruction of ELs is that if teachers have varying beliefs of how language is acquired in a single district, this poses an equity issue in that some students are receiving instruction from teachers whose beliefs align to the literature on language acquisition and some from teachers whose beliefs align to the literature on language development. Therefore, if there are varying beliefs of how language, to include a second language, is acquired, how does this play out when ELs are being looked at for a disability? How do educators show whether a student is responding to “language” instruction based on differing beliefs between development and acquisition? Although this study did not investigate the correlation between teacher beliefs and student achievement, the results of this study is significant in that it highlights the need for a common theoretical framework of how language is acquired and PD aligned to this framework in order to impact classroom practice, which hopefully will reduce the overrepresentation of ELs in special education programs, the disparities in student achievement within this subgroup, and the time ELs spend in EL programs across the district.

Summary of Chapters

This chapter provided background on the context for this study. With the heavy influence of cognitivism (Atkinson, 2011) in SLA instructional practices, the increased demands of the new standards, low academic achievement of ELs, and the large percentage of LTELs in the program, the traditional SLA paradigm needs to
shift. Additionally, teachers’ beliefs and impact on classroom practice need further
development and investigation, particularly for second language teachers that may
explain the reason beliefs and ultimately classroom practices do not shift. To address
this need, Heritage, Walqui, and Linquanti (2015) recommended ten key pedagogical
shifts they believe are critical in moving the needle for ELs. Therefore, this researcher
sought to 1) to determine if the Arwood Neuroeducation Model (ANM) supports the
pedagogical shifts recommended by Heritage, Walqui, and Linquanti (2015); and 2) If
those district educators with and without a professional background in both the
pedagogical shifts and in educating ELs based on the ANM show beliefs about
language development and/or language acquisition that are aligned with their
classroom practices. This chapter outlined the problem, background of the study,
research questions, the theoretical framework, overview of the methods, overview of
the results, and the significance of this study to the field of SLA.

Chapter Two provides the background of the study, the literature to support the
study by reviewing the historical context of SLA and alignment to the pedagogical
shifts recommended by Heritage, Walqui, and Linquanti (2015). Additionally,
Chapter Two used the lens of ANM to provide a translational perspective for the
current research on SLA by overlapping three fields of cognitive psychology,
neuroscience, and language function in the context of the pedagogical shifts. Lastly, a
review of teachers’ attitudes and the theory to practice dichotomy to include teacher
change were included in this Chapter. Chapter Three provides an outline of the
methods, setting, selection of participants, instruments, procedures and data analysis
for this study. Results and findings for this study are reported in Chapter Four. The
study concludes with Chapter Five with implications for the use of a new theoretical framework to add to the SLA literature, a new approach for using a common theoretical framework centered around language acquisition to impact classroom practice, a different approach for designing programs for ELs to be more inclusive, future studies, and limitations of the study.
Chapter Two

Review of Literature

Chapter One provided the introduction to the theoretical framework of this study, the research questions, and the findings of this study. This Chapter, Review of Literature, provides the literature related to the connection between the pedagogical shifts by Heritage et al. and ANM, and how teachers’ beliefs impact the ability of teachers to make these shifts and influence classroom practice.

Overall, the purpose of this study was twofold: (1) To determine if the Arwood Neuroeducation Model (ANM) supports the pedagogical shifts recommended by Heritage, Walqui, and Linquanti (2015); and (2) If those district educators with and without a professional background in both the pedagogical shifts and in educating ELs based on the ANM showed beliefs about language development and/or language acquisition that were aligned with their classroom practices.

Background

The background for this study comes from two gaps in the field of educating ELs: (1) Current approaches are not adequately meeting the needs of ELs; and (2) SLA methods are changing to meet the demands of the new standards.

Proficiency of ELs: A Challenge

Academic performance of ELs in the United States is well below that of their peers and ELs have the highest-grade retention and dropout rates of all youth (Durán,
According to the Digest of Education Statistics (2016) the status dropout rate decreased from 11% in 2000, to 6 percent in 2015. The Hispanic status dropout rate decreased by nineteen percentage points, while the Black and White status dropout rates decreased by seven and two percentage points, respectively (Digest of Education Statistics, 2016). Nevertheless, in 2015, the Hispanic status dropout rate remained higher than the Black and White status dropout rates (Digest of Education Statistics, 2016). In Texas, only 39% of ELs graduated compared to 78% of all students (Migration Policy Institute, 2015). In Oregon, the dropout rate for all students was 4% while the rate for ELs was 8%; and, for the Hispanic subgroup, the rate was 6% for the 2014-2015 school year (Oregon Department of Education, 2015). The National Center for Education Statistics (2005) reported that on the National Assessment of Educational Progress (NAEP), only 29% of ELs scored at or above the basic level in reading, compared with 75% of non-ELs. Only 13% of fourth grade Hispanic students and 15% of 8th grade Hispanic students met proficiency standards in the area of reading (Kamps, Abbott, Greenwood, Arreaga-Mayer, Wills, & Longstaff, 2007).

As the numbers of ELs increases, so will the disproportionate representation of ELs in Special Education (SPED). Such increases in this disproportionate representation increases problems of identification as well as education for these groups (Artiles, Rueda, Salazar & Higareda, 2005). English Learner Students with Disabilities (ELSWD) is a growing subgroup within the EL population and represents about 9% of ELs in the United States and 8% of Students with Special Needs (National Symposium of Learning Disabilities in English Language Learners, 2004;
Zehler, Fleischman, Hopstock, Pendzick, & Stephenson, 2003). ELs are underrepresented in special education programs overall but overrepresented in specific categories such as Speech/Language Impairments (SI), Learning Disabilities (LD), LD/SI combinations, and Emotionally Disturbed (Collier, 2014). In Washington, ELs with a language-learning disability represent 13% of the total population and non-ELs with a language-learning disability represent only 6% of the total population (Collier, 2014). For emotional and behavioral disorder category, ELs represent 4% of the EBD population while non-ELs represent only 3% (Collier, 2014). In Massachusetts, ELs labeled with a communication disorder represent 23% of the total population whereas non-ELs with a communication disorder only 18% (Collier, 2014). Intellectual disability among the EL subgroup was 16% whereas for the non-EL group it was 7% (Collier, 2014). School districts regularly referred large numbers of ELs to special education programs as a solution for improving achievement outcomes for ELs (Huang, Clarke, Milczarski & Raby, 2011).

There are many reasons for the over and underrepresentations, which includes a misdiagnosis of learning disabilities due to a lack of knowledge of the process of language acquisition (Case & Taylor, 2005; Harry & Klingner, 2006) as well as inconsistent referral processes and ineffective diagnostic tools to separate language acquisition from a language-learning disability (Artiles & Ortiz, 2002; Chu & Flores, 2011). Ortiz, Robertson, Wilkinson, Liu, McGhee, and Kushner (2011) found that “data from three interrelated studies of English Language Learners who were identified as having reading-related learning disabilities suggest that the majority of participants were misclassified” (p. 316). There has been significant over-
identification of ELs in special education programs under the language-learning disability label. Additionally, children of all racial/ethnic groups were at risk for over-identification with the exception of Asian/Pacific Islanders (Donovan & Cross, 2002). Hispanic/Latino students are only slightly overrepresented in the category of language-learning disability (Klingner, Eppolito, Hoover, Soltero-González, Smith, White, & Cana Rodriguez, 2005). Another possible reason for the misdiagnosis is that it is a challenge to discern among characteristics of language acquisition, acculturation, culture shock and an undiagnosed language-learning disability (Collier, 2014). There are overlaps of these characteristics in ELs with and without a language-learning disability such as poor comprehension; difficulty following directions; errors in grammar, syntax; and difficulty completing tasks (Chu & Flores, 2011), which makes it difficult for educators to determine whether these are natural behaviors typical of being new to a country or a true disability.

Students falling behind their peers are often labeled Long-Term English Learners (LTELs) (WestEd, 2016). This term has increasingly been used to describe ELs educated in the United States who have not met the criteria to be considered proficient in English. Every state has the flexibility to define the time that ELs will be labeled as a LTEL. Although definitions vary, LTELs are defined as students who have attended U.S. schools for six or seven years or more and have not reached proficiency in English (Klingner & Eppolito, 2014; Menken & Kleyn, 2010; Olsen, 2010). In New York, a LTEL is defined as an EL who receives English learner services for six or more years without being reclassified as a former EL (New York Department of Education, 2013). Characteristics of LTELs include having strong oral
language skills as well as social language skills but who are limited in literacy and academic language in both their native and second language. This academic limitation may be attributed to inconsistent schooling or inconsistent instructional programming for these students (Menken & Kleyn, 2009). Olsen (2010) describes a LTEL as having weak academic language with evidence of gaps in reading and writing as well as a lack of rich oral language in scholastic English needed to succeed in the academic setting. Additionally, LTELs exhibit little literacy skills in both their first and second languages (Olsen, 2010). About 59% of ELs in secondary schools in the state of California are labeled as LTELs and one out of three districts in California have more than 75% of their ELs considered as long-term (Olsen, 2010). As LTELs “fail” to learn a second language, these students become subject to identification for special education services under the eligibility category of a language-learning disability (Burr, Haas, & Ferriere, 2015; Haas, Huang, & Tran, 2014a, 2014b).

ELs challenge the educational system due to their diversity in terms of immigration status, socioeconomic background, nationality, ethnicity, and generation (August & Hakuta, 1997). The majority of ELs (52%) are born in the United States and are second generation Hispanics (Fry & Passell, 2009). About 89% of ELs in the United States speak Spanish as their first language and the second most spoken language is Arabic, which represents 3% of the EL population (OELA, 2015). Also, 76% of elementary ELs and 56% of secondary ELs are born in the United States and more than 50% of these students are second or third generation U.S. citizens (Capps, Fix, Murray, Ost, & Herwantoro, 2005). Most of the ELs in the United States fit the definition of a simultaneous bilingual learner, which is a student who has been
exposed to two languages together from birth to age five (Valdés, Menken, & Castro, 2015). ELs in K-12 public school settings represent more than 149 different languages (Holmes, Rutledge & Gauthier, 2009). Herbert (2012) highlights the fact that cultural backgrounds and stages of first language proficiency set the stage for how ELs develop prior knowledge and how they think about the new experiences, they absorb in the new environment.

In summary, educators are challenged by the impact of ELs not reaching proficiency resulting in their academic achievement being lower than for peers; ELs misdiagnosis as having a learning disability leading to an overrepresentation of ELs in special education programs; ELs often categorized as LTELs; and ELs suffering other unintended consequences impacting their social and emotional well-being. In addition to the aforementioned challenges, new standards have also challenged educators working with ELs.

**ELs and the New Standards**

The new standards include the Common Core State Standards (CCSS), the New Generation Science Standards (NGSS), and the English Language Proficiency (ELP) standards Valdés, Kibler, and Walqui (2014) note that “there is a lack of uniformity in the field of English language teaching, and concern was also expressed about the lack of recognition of ESL as an academic content area equivalent to other content areas, such as math or science” (p. 1). Even though ELD teachers were not part of the policy reform conversation regarding the new standards, their role in the implementation of the new standards is critical to the success of ELs (Valdés, Kibler, & Walqui, 2014). These standards are examples of college and career ready standards
developed as a response to “ongoing globalization and represent current societal expectations of the competencies U.S. students need to acquire to be productive citizens and effective contributors to a vibrant economy” (Heritage, Walqui, & Linquanti, 2015, p. 2). These new standards require students to use more deep, extensive language. For example, the CCSS asks students to explain and justify their arguments using research and evidence. The NGSS require students construct explanations, argue using relevant evidence from the literature, and communicate articulately the information gathered. The standards explicitly include ELs and “clearly frame content learning as engagement in disciplinary practices-implying an active learning process in which language plays a key role” (Valdés, Kibler, & Walqui, 2014, p. 9). The challenge is in the increased demands of the content and language expectations of ELs often known as “double the work,” acquire an additional language and acquire content knowledge through analytical practices. This challenge questions the responsibility of the content and ELD teachers, as to where the acquisition of language actually takes place. Heritage, Walqui, and Linquanti (2015) provide a perspective to this dilemma:

Preparing ELL students to achieve the language and learning expectations of collect and career ready standards is not the sole responsibility of a small cadre of language specialists teaching English-as-a-second-language (ESL) classes. For children entering school with little or no English, there is a pivotal role for ESL teachers to develop students’ initial English language, both social and academic, in deep, accelerated ways. However, once students have moved beyond the emergent level of proficiency in English, further development of
the academic uses of language becomes the responsibility of every teacher. (p. 3)

In addition to the standards expecting more use of language, another major challenge is in the assessment used to evaluate the impact of the standards on student achievement while holding districts accountable for ELs achievement. There were two consortia, the Smarter Balanced Assessment Consortium (SBAC) and the Partnership for Assessment of Readiness for College and Careers (PARCC) funded by the U.S. Department of Education to develop assessments aligned with the CCSS. The assessments were to include accommodations for ELs and students with disabilities. The NGSS assessments have yet to be released. The challenge for ELs is that not only are they assessed with ELP standards for language proficiency, they are also assessed on the CCSS, SBAC for ELA and Math to measure attainment of the knowledge and skills outlined in the new standards documents (Valdés, Kibler, & Walqui, 2014).

The primary challenge with the ELP standards relates to how educators conceptualize the language standards and how educators measure English proficiency growth, which has many serious consequences of teachers of ELs (Valdés, Kibler, & Walqui, 2014). For example, Valdés, Kibler, and Walqui (2014) state that:

If it is assumed that language is a set of vocabulary and structures that can be taught in a well-established order, practiced, automatized, and put into use, then ELP standards will describe a linear developmental progression that establishes the order and sequence of vocabulary and grammatical forms and structures that students will be expected to acquire over time. ESL instruction
will then be expected to produce students who can exhibit growth in the correct or fluent use of such structures or vocabulary. On the other hand, if language is viewed as a complex performance for communicating and interactively constructing meaning that involves the command of specific skills (listening, speaking, reading, and writing), ELP standards will instead describe the order in which particular subskills will be acquired and directly or indirectly inform the corresponding instruction that is expected to bring about such skill development. These conceptualizations about language deeply influence instructional arrangements, classification of learners, and approaches to teaching. (p. 9)

There is also another challenge of varying possible approaches to organizing the language progressions and to developing measurement instruments, which have led to difficulties in consistency between the states. Although there is progress in ELD teachers making this shift to the new standards, there is still room for improvement in addressing the complexity of the new standards (Atkinson, 2011; Heritage, Walqui, & Linquanti, 2015; Mitchell & Myers, 2004; Myles, 2013; Valdés, Kibler, & Walqui, 2014; VanPatten & Williams, 2015).

The rationale for including information on the background of the study is to paint a picture of the current realities ELs face today in order to consider whether or not the neuroeducation model used in this study might contribute to better understanding of the acquisition of language and therefore better methods to reach ELs. However, in order to fully understand where SLA is at today, it is important to take a look back and consider the roots of the past and how the past contributed to the
current position of SLA, which is “a position of emerging strength, albeit with greater conflict” (Gass, Lee, & Roots, 2007, p. 788). The next section will provide historical context for the SLA theories and practices.

**Historical Context of Second Language Acquisition**

The history of SLA has its roots in western tradition, specifically in Europe, by the sixth or seventh century CE when the romance languages diverged from Latin being spoken natively. This caused problems as many written materials and instructional practices had been designed for native speakers of Latin (Thomas, 2013). Classroom practices had to shift, as Latin was no longer anyone’s native language. This prompted the conceptualization of the nature of second language learning by Roman scholars who attempted to answer key questions such as the type of exposure needed in order to acquire a second language, the faculties learners bring to the process of learning a second language, and the role of the social context in the process of acquiring a second language. The Romans did not have the answers to these questions, however, subsequent teachers and scholars continue to ask and answer questions specific to the nature of acquiring a second language (Thomas, 2013).

Although there are traces in the history of SLA linked to Western Europe, modern scholars (Block, 2003; Gass, 2013; Gass, Fleck, Leder, & Svetics, 1998) prefer to view the origination of SLA studies around the middle of the twentieth century when SLA was identified as a scientific discipline in which the scientific method was used to build powerful models of SLA. This scientific approach opened up new insights and lead to a plethora of theories and approaches used to characterize today’s field of SLA (Jordan, 2004). Some researchers, such as VanPatten and Williams (2015), went
as far as to state that in order for the field of SLA to be recognized as a research field, the field must be driven by theory. VanPatten and Williams (2015) do not state, however, whether the field should be driven by one comprehensive theory or many theories. Therefore, the current context of SLA has evolved over the years and is now recognized as a field grounded on many theories, models, hypotheses, and approaches sometimes in competing and contradictory ways (Atkinson, 2011; Myles, 2013; VanPatten & Williams, 2015), which makes SLA theorizing rather confusing (Myles, 2013).

SLA theorizing is confusing for many reasons. One reason is that the constructs within SLA can be construed in different ways depending on the context and therefore, should be defined. The first construct that needs to be defined is the term “second” in SLA. Larsen-Freeman and Freeman (2008) describe the study of language as “highly protean” and makes a distinction between language taught as a second language and a foreign language (p. 147). English as a foreign and a second language is dependent on the speaker (Larsen-Freeman & Freeman, 2008). For example, Spanish taught in the United States can be foreign to those with little or no knowledge of the language. However, Spanish can be considered a second language to those who use it in addition to their first language. Spanish could also be considered native for those for whom it is a language spoken at home and is a heritage language (Larsen-Freeman & Freeman, 2008). Additionally, Joshua Fishman, in the late 1970s, and Guadalupe Valdés, in the early 2000s, proposed that a second language that is learned after the first language could be learned as a foreign language or a second language (Heritage, Walqui, & Linquanti, 2015). Because of this variability in
defining the term *second* language, there needs to be consistency in how the term is used in the SLA context. As mentioned, the term *second* language is sometimes referred to as the language learned in a country where the language is spoken. For example, Italians learning English in the United States and Americans learning Japanese in Japan are considered *second* language learners. Foreign language learners are also learning a *second* language but in this context, the *second* language is not spoken outside of the classroom. VanPatten and Williams (2015) state that if *second* language is defined in these restrictive ways, any theory of SLA will also need to be limited to this context of learning. An all-encompassing way to define a *second* language is by using the term *second* to mean any language other than a student’s first language regardless of the language, the location of where the language is learned, and how it is learned (VanPatten & Williams, 2015). Therefore, any theory of SLA using this definition will have to apply to any student learning Spanish in Spain without any instruction or French in a foreign language classroom in Oregon. For the context of this study, the term *second* will take on the all-encompassing definition.

The next construct that needs defining is *language* in the term SLA. *Language* can be defined in terms of speech, the rules that govern speech production, or it can mean the unconscious knowledge system consisting of the sound system, the mental dictionary, syntactic rules, word formation rules, and the rules of language learned in context. However, such a definition of language is limited to the structural components of describing a language, not the way language represents thinking, planning, emoting, etc. Language will be defined more in depth later in the chapter.

Lastly, the construct *acquisition* in the term SLA needs to be defined. *Acquisition* can
be defined in terms of obtaining or learning a language. *Acquisition* is often used interchangeably with the word development but in the context of the theoretical framework used for this study, there are differences between language development and language acquisition. These differences will be addressed in depth later in the chapter.

Another reason SLA theorizing is confusing is that learning a second language is a complex and multifaceted phenomenon (Myles, 2013) that is explained using different theoretical and methodological tools. For example, linguistic theories are used to study the linguistic system underlying a learner’s production and neurolinguistic theories are used to study the neurological basis underlying the second language (Myles, 2013). Therefore, different theoretical approaches adopt widely differing views on the nature of language, the language acquisition process (first and second), and the role of the language learner in the acquisition process (Myles, 2013). Myles (2013) calls groups of theories that focus on broad subdomains of SLA research, theoretical families. These theoretical families may be broken into different categories that explore different aspects of the SLA process. For example, one theoretical family may explore the linguistic system of SLA, whereas another theoretical family may explore the cognitive system of SLA. Another group may explore the psychological dimensions of SLA and another group may concentrate on the social factors influencing SLA. This separation of theories into linguistic, cognitive, and social groups or families may seem “artificial” since the acquisition process of learning language, and the functional use of language “routinely involve all three at the same time” (Myles, 2013, p. 1). Some theoretical approaches that take a
social approach to the process of SLA argue against this separation on the grounds that
the process of SLA is social in nature and therefore, the environment cannot be
removed from this context (Myles, 2013). However, as mentioned, there is not one
theory that has been used to explain all aspects of SLA (Atkinson, 2011; Heritage,
Walqui, & Linquanti, 2015; Mitchell & Myles, 2004; Myles, 2013; VanPatten &
Williams, 2015), which leaves the field with a multiplicity of approaches addressing
many dimensions of the process of SLA.

Given the variety of theories and approaches that exist, the theoretical families
may be divided into three instrumental eras that influenced the field of SLA:
behaviorism, cognitive psychology, and then recently, the field has made a social turn
to include sociocultural theories and approaches. There are theories of SLA that are
divided between formalists, cognitivists, and functionalists views. Formalist views
hold that there is a singular mechanism and an asset of parameters that underlie the
abstract structure of language that must be acquired; cognitivists view the process of
acquiring a language through mental processes including how people perceive, think,
remember, learn, and solve problems; and, functionalists believe that language should
be taught and understood in the context in which it is used and that acquisition is
social in nature (Tomasello, 2004; Trumbell & Farr, 2005). The next few sections will
provide an overview of the three key influences that have impacted the field of SLA.
The rationale for including these sections is to provide the literature necessary to
understand the current and dominant paradigm of SLA. This will lay the groundwork
for considering neuroeducation in the context of SLA.
Behaviorism and SLA

Behaviorism had its roots in psychology, specifically animal psychology, as psychologists believed that humans, like animal subjects, should be studied in terms of their observable actions (O’Donnell, 1985). Therefore, formalists and SLA researchers were heavily influenced by behaviorism and behaviorist-type approaches that viewed language acquisition as a process of trials, errors, and rewards for success and punishment for failures. Highly influenced by European Empiricism around the early 19th Century, behaviorists believed that children learned their native language by simply imitating the speech of adults (Koster, 2013; Lavadenz, 2010). Learning was a response to environmental stimuli that could be manipulated, observed, described with attention to the observable behaviors produced by the child (Skinner, 1938; Watson, 1919). This lead to a number of methods, hypotheses, and theories of SLA that focused on habit-forming and error correction practices that made their way into the classroom but without much success such as grammar-translation method, direct method, audiolingual method, contrastive analysis, and interlanguage (Bialystok & Hakuta, 1994; Brooks, 1960; Brown, 1994; Crawford, 2004; Ellis, 1985; Hakuta, 1987; Heritage, Walqui, & Linquanti, 2015; Kaplan, 1988; Koster, 2013; Krashen, 1981; Larsen-Freeman & Freeman, 2008; Larsen-Freeman & Long, 1991; Mitchell, Myles, & Marsden, 2013; Stockwell, Bowen, & Martin, 1965; Tarone, 2006; Trumbull & Farr, 2005; Valdés, Kibler, & Walqui, 2014). Additionally, Bialystok and Hakuta (1994) reported that although evidence and data gathered from error correction strategies yielded disappointing results, the significance to the field of SLA was that there was an important discovery made which was that learners approached the task of
learning a second language in much the same ways as they approached learning their first language (Corder, 1967; Dulay & Burt, 1974).

Concepts of transferring, imitating, teaching elements, direct instruction for example, found in these SLA beliefs were greatly influenced by the theory of behaviorism. Many ESL curricula, courses, and instructional practices operate with behaviorist influences. Teachers continue to correct errors of second language learners as soon as they are made in fear the learner will pick up bad language habits (Heritage, Walqui, & Linquanti, 2015; Valdés, Kibler, & Walqui, 2014). Habituation stems from the behaviorist notion that language parts must be practiced until they become automatic (Heritage, Walqui, & Linquanti, 2015). For example, using worksheets where students fill in the blanks in sentences with the correct verb results in practicing to form habituation (Heritage, Walqui, & Linquanti, 2015). Then, the field shifted to viewing language acquisition as an innate process.

**Cognitive Psychology and SLA**

In the 1950s-1970s, Chomsky’s UG theory proposed that there was a Language Acquisition Device (LAD) innate to all humans that helped with the acquisition of language whether language was taught as a first or second language. Chomsky attempted to address the nature versus nurture debacle by offering a biolinguistic idea that “language has a core that can be compared to an organ, or rather, to a computational system of the kind found in mammalian vision” (Koster, 2013). This period of dominance is also called the Chomskyan Revolution (Crawford, 2004; Katz, 1996; Koster, 2013). Although Chomsky’s UG might have fit with the research on first language acquisition, he did make a connection between first
language acquisition and SLA. Also, Chomsky never offered a theory of language
acquisition but rather his LAD defined the space and initial conditions for human
languages to make it possible for any language to be acquired (Lidz, 2016).
Therefore, there was a connection between cognitive theories such as Chomsky’s and
the field of SLA. Valdés, Kibler, Walqui (2014) state:

Chomsky’s publication of *Syntactic Structures* (1957) and his 1959 review of
Skinner’s *Verbal Behavior* strongly criticized behaviorism and proposed that
language was competence – the tacit knowledge that native speakers have of
the rules of language, which enables them to produce and understand
utterances in communication – and consequently, competence should be the
center of linguistic study. Performance, speakers’ actual realization of their
competence, considered flawed and imperfect is therefore left outside of the
realm of linguistic interest. Chomsky’s ideas had a delayed yet long-lasting
effect in English language teaching. Although Chomsky was not interested in
applied linguistics himself, his cognitive revolution marked a transition in
applied linguistics and the field of L2 teaching from emphasis on habit
automatization and drilling to input and cognitive rule learning. (p.22)

For Chomsky, learning the structures of a language was critical in the
acquisition of this language. His concept of acquisition was that this LAD accounted
for language. However, this LAD did not account for the differences between child
and adult differences in language nor did he account for children who did not acquire
language (Greene, 1972; Lenneberg, 1967). For example, native Australian languages
such as Warlpiri, did not have consistent grammatical elements and these elements
such as noun and verb phrases were scattered which did not fit well into Chomsky’s concept of a LAD (Tomasello & Ibbotson, 2016). Languages such as Basque and Urdu also did not fit into Chomsky’s LAD as the way a sentence subject is used is very different than other European languages (Tomasello & Ibbotson, 2016). Chomsky also did not consider cultural differences that affect language structure such as the differences between Japanese or English (Tomasello & Ibbotson, 2016).

However, there have been recent advances to connect the role of UG within SLA, specifically the SLA of syntax (White, 2011; Hawkins, 2011, 2008b, 2009; Herschensohn, 2000; Leung, 2009; Thomas, 2004). Pinker (2016) states that support for Chomsky’s theories are in the minority as there is not clarity as to what his theory of language refers. However, until there exists a precise language acquisition model that has been proven to succeed in mastering the structure of any language, Chomsky’s fundamental claim that language is innate will endure in one form or another (Horgan, 2016).

Since the development of the UG theory, other researchers (Anderson, 1983; Cummins, 1984; Krashen, 2003; Krashen & Terrell, 1983) jumped on the Chomsky train and used this idea of a UG to explain how language was acquired in universal ways. For example, still building off of Chomsky’s notions of language learning in that rules of a language develop in the minds of language learners in universal ways, Krashen and Terrell (1983) developed a five hypotheses approach to SLA and teaching practice (Heritage, Walqui, & Linquanti, 2015; Valdés, Kibler, & Walqui, 2014) such as the acquisition-learning hypothesis, the monitor hypothesis, the natural order hypothesis, the input hypothesis, and the affective filter hypothesis (Heritage,
Walqui, & Linquanti, 2015; Krashen, 2003; Trumbull & Farr, 2005; Valdés, Kibler, & Walqui, 2014). Krashen and Terrell’s contribution to the field of SLA was critical, particularly for educators of ELs as beliefs were shaped by theories that posited how language learners acquired a second language through exposure of the second language, unconscious learning (Heritage, Walqui, & Linquanti, 2015; Krashen, 2003; Trumbull & Farr, 2005) and through the conscious study of the rules of the language focused on the structures of the language and are processed, stored, and used in various ways (Krashen, 2003). Additionally, studying the grammar of the language, did not affect the natural order of how language was learned as language learners acquired the rules of language in a universally predictable way not influenced by instruction (Valdés, Kibler, & Walqui, 2014). However, the one hypothesis that gained much attention was the input hypothesis, which claimed that if “i” was the last rule we learned about language, i+1 was the next structure we were ready to acquire (Krashen, 2003; Krashen & Terrell, 1983). The input hypothesis was met with much criticism (Swain, 1985; Trumbull & Farr, 2005). For example, Swain (1985) stated that the catalyst for acquiring a language was not in the input that was received but on the output that learners generated through the learning opportunities, of which they took advantage. According to Swain, the output was more indicative of how much a language learner knew and understood since using language allowed the language learner to test the hypothesis about the language (Trumbull & Farr, 2005). The current paradigm of SLA is still influx with this input-output debate, as some SLA researchers still believe input is critical to the acquisition process. Others believe that output
defines the communicative purposes for which language is used to negotiate meaning and tasks of our daily lives (Swain, 1985; Trumbull & Farr, 2005).

These different methods and approaches to SLA had a strong theoretical foundation in cognitive psychology, which Heritage, Walqui, and Linquanti (2015) posit does not fully align with how language is acquired and therefore, instructional practices need to shift. Then, the field shifted to view the process of acquiring a second language in a more social and interactive setting, which aligns well with the pedagogical shift from seeing language acquisition as an individual process to understanding it as a social process.

**Social Turn and SLA**

After many years of cognitive dominance in the field of SLA, the field started to take a social turn somewhere between the 1980s-present. Some researchers (Gass, Lee & Roots, 2007) believe the social turn began with the publication of Firth and Wagner’s (1997) article arguing for a complete reconceptualization of SLA that would enlarge the parameters of the field. According to Firth and Wagner (1997), “the methodologies, theories, and foci within SLA reflect an imbalance between cognitive and mentalistic orientations, and social and contextual orientations to language, the former being unquestionably in the ascendancy” (Abstract). However, there have been links to this idea of the acquisition of language being social in nature and that culture and environment were essential for acquisition to take place with the claims made by Bruner (1972) and Vygotsky (1962). This wave of theories and approaches in the field of SLA started to explore the role of the social context in terms of the social status of the speakers or languages spoken, the specific communicative needs in
the different social contexts (Firth and Wagner, 1997; Jenkins, 2007), and the co-construction of identities in the diverse communities where language was spoken (Norton, 2000; Pavlenko & Blackledge, 2004).

For example, the *acculturation theory* drew attention from SLA researchers by recognizing that language was a key element of culture that bound the learner to the learner’s community (Trumball & Farr, 2005). Then, the *communication accommodation theory* was defined as the movement toward and away from others in the environment depending on the speech patterns or communicative behavior of the learner and that progress toward proficiency in a second language happened when upward convergence was used rather than downward divergence as downward divergence resulted in Selinker’s term, fossilization (Giles, Coupland, & Coupland, 1991; Trumbull & Farr, 2005). *Discourse theory* was similar to the communication accommodation theory, which suggested that SLA occurred through language use and interaction (Ellis, 1986; Trumbull and Farr, 2005). The *variable competence model* proposed that the way a language was acquired was a reflection of how the learner was using that language and in what context and that the communication could be planned or unplanned, spontaneous or formal communication (Ellis, 1984).

The social turn era also included a series of contemporary theories, hypotheses, methods, and approaches with cognitive and language use influences that were more common in SLA classrooms today. For example, the *input processing theory* developed by VanPatten (2015) was not a comprehensive theory of language acquisition but of comprehension and operated under the assumption that “comprehension cannot guarantee acquisition and acquisition cannot happen if
comprehension does not occur” (p. 113) because acquisition involved learners making appropriate form-meaning connections during the comprehension process. Input processing (IP) was concerned with how learners were making initial form-meaning connections, why learners made these form-meaning connections at some times and not others, and what internal psycholinguistic strategies learners used to comprehend sentences to influence the acquisition process. Then, neurobiological theories of first and second language acquisition influenced the development of the declarative/procedural (DP) model, which considered how two memory systems, declarative and procedural memory, interacted and played critical roles in the process of acquiring a language. Declarative and procedural memory systems were the two most important long-term memory systems in the brain in terms of how many regions were impacted and the functions of these regions (Ullman & Pullman, 2015). The interaction approach subsumed some aspects of Krashen’s Input Hypothesis and Swain’s Output Hypothesis and described the processes involved when learners encountered input, engaged in interaction, received interaction feedback that then resulted in an output. This approach is now commonly accepted within the SLA literature and has experienced growth in empirical research allowing meta-analyses and research syntheses to be carried out by researchers (Gass, 2013; Keck, Iberri-Shea, TracyVentura, & Wa-Mbaleka, 2006; Li, 2010; Lyster & Saito, 2010; Mackey & Goo, 2007; Norris & Ortega, 2000; Plonsky & Gass, 2011; Russell & Spada, 2006). Additionally, this approach has been referred to as the “model that dominates current SLA research” (Ramirez, 2005, p. 293) and Byrnes (2005) referred to it as the “dominant interactionist paradigm” (p. 296).
Then, the field of SLA started to shift from thinking that language acquisition was a unidirectional, linear process to understanding language acquisition as a complex and multivariate process. Therefore, aggregating findings across SLA studies seemed impossible given the variability of theories that existed in the field (Atkinson, 2011). This variability was largely due to the uniqueness of the individual learner and the social contexts in which the learner lived and studied. Language acquisition, therefore, was not a simple process involving the transferring of mental systems from one brain to the other (Heritage, Walqui, & Linquanti, 2015). The process of SLA was a complex, adaptive system that emerged from the bottom-up through multiple interactions with agents in speech communities (Heritage, Walqui, & Linquanti, 2015; Larsen-Freeman, 1997; Ellis & Larsen-Freeman, 2009). This background is important in understanding the foundation of complexity theory, which had its roots in the physical sciences. Complexity theory was concerned with organized complexity (Larsen-Freeman, 2011) in which the number of variables was not a deciding factor in studies or experiments but that the sizeable number of factors interweaved and interconnected into an organic whole. Organized complexity could be distinguished from disorganized complexity where the individual variables or factors did not make up a whole and that at any time a factor may exhibit erratic behaviors. In other words, the sum of their parts makes up the whole (Bertalanffy, 1950) but that the relationship of the parts keep changing with some parts playing more of a central role than other parts at certain times. To clarify, this means that through complexity theory, the process of acquiring language is a non-linear process.
that evolves over time and changes depending on the learner. Larsen-Freeman (2011) states:

Just as a bird flock emerges out of the interaction of individual birds, complex systems self-organize via the interaction of their parts. Self-organization is the creation of more complex order spontaneously, without outside influence or internal plan (Mitchell, 2003). That is, stabilities in a dynamic system emerge. This dynamic process is responsible for the patterns and orderly arrangement of both the natural world and the realms of mind, society, and culture (Heylighen, 2008). (p. 51)

Then, the *Identity Theory* added to the complexity theory in the context of SLA and was concerned with two central points. The first central point was that SLA theorists needed a comprehensive theory of identity that integrated the language learner to the social world in which the learner lived (Atkinson, 2011), which was important as language learners would typically appropriate more desirable identities with respect to the target language community and would often take on multiple identities. The second central point of Identity Theory was that SLA theorists needed to address the relationship of power of the target language community and how this power impacted the learners’ access to this community. In other words, the ways in which language learners were socially structured, both formally and informally, to practice speaking, reading, and writing were vital to the SLA process and so the dynamic of power needed to be addressed as this power could impact the process of SLA (Norton & McKinney, 2011). Norton and McKinney (2011) stated:
Identity theorists thus question the view that learners can be defined in binary terms as motivated or unmotivated, introverted or extroverted, inhibited or uninhibited, without considering that such affective factors are frequently socially constructed in inequitable relations of power, changing over time and space, and possibly coexisting in contradictory ways within a single individual. (p. 73).

Adding to the social turn era was a theory called Sociocultural Theory (SCT), which had its roots in the writings of Vygotsky (1962) and argued that “while human neurobiology is a necessary condition for higher mental processes, the most important forms of human cognitive activity develop through interaction within social and material environments, including conditions found in instructional settings” (Engeström, 1987; Lantolf, 2011; VanPatten & Williams, 2015, p. 207). SCT, although not directly a SLA theory, had much to offer SLA regarding how individuals acquired and used languages beyond their first language, which gave rise to the use of SCT in the context of SLA also known as SCT-L2 (Frawley & Lantolf, 1985; Lantolf, 2011). The theory had several constructs and at the center of the theory was this concept of mediation, using the second language to mediate or regulate or control mental and communicative activity. Then, internalization and the Zone of Proximal Development (ZPD) made up the other constructs of the theory. SCT and the ZPD align with the literature on language acquisition as discussed in a later section.

Then, adding cognition to the social aspect of language acquisition, a sociocognitive approach was concerned with how the mind, body, and the world worked together in learning a second or additional language (Atkinson, 2011). A sociocognitive approach was based on the notion that in the context of SLA, cognition
was considered a “fiction” (Atkinson, 2011). Atkinson (2011) stated that humans were adaptive organisms and survived by consistently adapting to their ever-changing environment. This idea brought about several implications in various aspects of SLA. The first implication was that instead of viewing learning as occurring mostly in formal settings such as a classroom at the command of a teacher with the purpose of learning abstract concepts, learning was a “state of human affairs” (Atkinson, 2011, p. 143). If humans consistently adapted to their environment, then learning, was continuous and was not controlled solely by a teacher. “Recent developments in cognitive science, neuroscience, anthropology, and biology support this view by re-envisioning cognition as an open system-as continuously and dynamically adapting to worldly conditions” (Atkinson, 2011, p. 144). A second implication was that cognition was extended and distributed out into the world through multimodal approaches invented by humans (Atkinson, 2011). Cognitive technologies aided not just cognition, such as eco social creations, computer, and cell phones; all aided cognition as well as the process of learning. A third implication was that in the context of SLA, a sociocognitive perspective viewed SLA as a natural, adaptive process and the best way to ensure the process of SLA was successful was to place the language learner in situations where the second language was needed to survive and prosper. A sociocognitive approach would force the language learner to use the second language in situations that helped them navigate the world around them so they were able to see the value in the second language.

The field of SLA evolved over the years and was influenced by many complementary theories, methods, and approaches in the behaviorism, cognitive
psychology, linguistics, sociocultural, and sociocognitive realms. Although still fairly new, the field of SLA has recently brought in theories of neuroscience to help explain the process of language acquisition. For example, a progressive theory that seemed to veer from the behaviorism and cognitive psychology movement of language teaching was the neurofunctional theory, which brought the literature on the brain (neuroscience) and language (from a language development perspective) together to describe the process of SLA. The premise of this theory was that there were parts of the brain that were responsible for the comprehension and production of language and that the neural circuitry in some of these areas developed at different times (Lamendella, 1977; Trumbull & Farr, 2005). However, current research indicates that all parts of the brain (not certain parts), to include the sensory receptors that send signals to the brain, work together to make sense of the input (Bookheimer, 2002; Lenneberg, 1967; Pulvermüller, 2013, 2017, 2018; Vigneau et al., 2006).

As described in this section, SLA theories have evolved throughout the years as new information about the brain and language acquisition became evident. The field of SLA has shifted based on influences from behaviorism, cognitive psychology, and the social turn. However, neuroscience is still a field that is new to SLA, which creates a pathway to new insights from neuroscience that can enhance the current context of SLA. Likewise, the demands of the new standards in educating ELs has forced educators to pay close attention to how language is taught in EL classrooms. To address the complexity of the new standards, Heritage, Walqui, and Linquanti (2015) recommended ten instructional practices that need to change in order to meet these standards outlined in Chapter One. This proposal by Heritage, Walqui, and
Linquanti (2015) for a shift in current SLA practices opens up the door to a new way of thinking and possibly the addition of a theory and model that considers the literature in neuroscience and language function.

The rationale for including this section on the historical context of SLA theories is to provide context of how earlier theories of second language instruction have shaped the beliefs and ultimately classroom practice of teachers of ELs. The next section will provide the literature for the first part of the study, which was an analysis of ANM and connection to the pedagogical shifts.

**Analysis of Arwood’s Neuroeducation Model and the Pedagogical Shifts**

After many years teaching and educating ELs using the SLA methods described in the previous section, the researcher was curious to know if neuroeducation could be used in the context of SLA. Chapter One explained the rationale for using ANM as the theoretical framework for this study and provided a brief description of the three lenses that overlap to show the connection between language, the brain, and the mind. In general, neuroeducation is a translational field where neuroscience research is typically applied through a cognitive lens to educational applications (Nouri & Mehrmohammandi, 2012). Although studying the brain and brain activity has its place in education, it still lacks breadth and depth in the absence of knowledge about human cognition and language function. Tommerdahl (2010) states “it is highly doubtful that any single given study in neurology will have a direct application to the classroom” and emphasizes the distance between studies in neuroscience and proven instructional methods realized in the classroom (p. 98). Tommerdahl (2010) describes a model to bridge education and neuroscience that involves five basic levels:
neuroscience, cognitive neuroscience, psychological mechanisms, educational theory, and the classroom. At the University of Portland, ANM overlaps neuroscience, cognitive psychology, and language function to describe the process of learning using a corresponding theory called the Neuro-Semantic Language Learning Theory (NsLLT) that serves as glue to all three fields. Arwood’s approach to neuroeducation differs from other neuroeducation models by adding the literature from language theory, which is critical as language is the mediating factor between the mind and brain (Arwood, 2011; Lenneberg, 1969). The next few sections will establish a theoretical framework in neuroeducation by providing a review of relevant literature in the three aforementioned lenses of ANM as they relate to the pedagogical shifts proposed by Heritage, Walqui, and Linquanti (2015).

Cognitive Psychology and SLA Pedagogical Shifts

Since the 1950s, there have been many studies of the mind that influenced the field of education such as measuring perception, attention, motivation, effort, and self-regulation (Anderson, 2010; Barsalou, 1999; Lucas et al., 2014; de Bruin & van Gog, 2012; Fin, Lee, Kraus, and Hudson Kam, 2014). Recent studies have moved away from studying the mind and behavior in isolation to a more integrated approach. Jack and Roepstorff (2002) proposed a paradigm shift in triangulating objective behavioral reports, recordings of brain activity, and retrospective reports in order to understand higher cognitive functions of humans. Additionally, Heritage, Walqui, and Linquanti (2015) proposed several shifts away from cognitivism to a more integrated approach to SLA. For example, Heritage, Walqui, and Linquanti (2015) proposed a shift away from teaching lessons focused on individual skills, ideas, or texts, from seeing
language acquisition as a linear, progressive, stair-step process, and from emphasizing discrete structural features of language.

**Individual Skills, Ideas, or Texts.** The acquisition of observable skills is an important area of cognitive psychology. Skill acquisition is described as developmental in the field of cognitive psychology. This means that the ability to acquire skills in a wide variety of content areas such as algebra, geometry, driving a car, and computer programming occur in different stages (Anderson, Bothell, Byrne, Douglass, Lebiere, & Qin, 2004; Posner, DiGirolamo, & Fernandez-Duque, 1997). Carlson (1997) defines skill acquisition as “the ability to routinely, reliably and fluently perform goal-directed activities as a result of practice with those activities” (p. 45). The process of skill acquisition takes place over a period of time starting from the presentation of information, then the implementation of this information into discreet behavioral routines, and then finally automatization, which is the change in knowledge from the initial presentation of information to the final stage of acquisition of this knowledge (DeKeyser, 2007).

**Linear, Progressive, Stair-Step Process.** Similar to skill acquisition, the ability to speak using conventional grammar in English is also described as developmental in the field of cognitive psychology (Greene, 1985; Halliday, 1977; Piaget, 1959; Searle, 1970). In SLA, gaining proficiency in a second language is also viewed as developmental in nature as outlined in the English Language Proficiency Standards for the 21st Century (ELPA21) (CCSSO, 2014). For example, a kindergarten student categorized as level one can communicate about familiar topics or experiences and by level five, the student should be able to communicate including
Describing language acquisition as a developmental process implies that acquiring a language is an innate, human characteristic (Chomsky, 1962) that should not be altered depending on environmental circumstances. However, there are numerous examples of children who do not acquire a language in a stair step, developmental manner (Arwood, 1991; Lenneberg, 1970; Lucas, 1977; Miller, 2011) and some examples of children that do not acquire language at all due to either neurobiological or genetic differences (Zampini & D’Odorico, 2013), physical trauma (Augoustinos, 1987), or due to extreme cases of neglect or physical abuse (Lum, Powell, Timms, & Snow, 2015). Sylvestre, Bussières, and Bouchard (2016) found that language skills of children who have experienced abuse and/or neglect were delayed compared to children who have not experienced abuse and/or neglect.

**Discrete Language Structures.** The emphasis on discrete structural features of language may have roots in earlier versions of Chomsky’s (1964, 1965) Universal Grammar (UG) theory and Language Acquisition Device (LAD) that claimed how learning the structures of a language such as nouns, phrases, and verbs was critical to the acquisition of a language as the grammatical structures of a language were universal in nature.

Language was often defined in terms of its structures and most eligibility assessments and interventions evaluate language and behavior through structures (American Speech-Language Hearing Association, 1993; Chomsky, 1968) but with very little understanding of how the language was used in context (Bruner, 1975;
Carroll, 1964; Chomsky, 1968). The structure of language was the identifiable parts of a language such as words, sentences, morphology, syntax, and surface semantics (Chomsky, 1968) and described using rules of language (Arwood, 2002; Arwood, 2011; Chomsky, 1968; Clark, 1977). These rules dictated how the structures were used within a language. “Language rules describe the language, not define the language” (Arwood, 2011, p. 24). Most literacy programs emphasized the use of language structures (Arwood, 2011). Traditional instruction for ELs involved teaching the use of the grammatical structures (or forms) in the language or how to accomplish specific language functions such as “suggest” or “introduce” (Heritage, Walqui, & Linquanti, 2015, p. 31). However, teaching just structures “in isolation from real, meaningful, discourse-based communication has not produced generative, transformative learning for ELs” (Heritage, Walqui, & Linquanti, 2015, p. 32).

Several studies looked at the structures of language to determine the level of acquisition, which was heavily influenced by behaviorism. For example, Brown (1966) and Brown and Bellugi (1964) studied children’s imitation and retention of their parents’ utterances to describe the processes of acquisition of syntax. They found that children imitated what parents said but at a reduced length and would leave out inflections, verbs, articles, prepositions, and conjunctions (Samuels, 1967). When parents expanded a child’s language, the child imitated the parent’s corrected version of the sentence therefore increasing the acquisition of language (McNeill, 1966; Samuels, 1967). However, there was no evidence that expansions were necessary for learning the structures of language or that expansions were superior to other structures of verbal feedback used to improve the language of culturally and linguistically
diverse students (Cazden, 1965; McNeill, 1966; Menyuk, 1964). Also, Bellugi (1965), Fraser, Bellugi, and Brown (1963), and Menyuk (1963) looked at language development in terms of language structures and sentence length and how many sentences children were able to produce by counting the average length of morphemes. Bellugi (1965) found that as students aged, the average length of morphemes increased and students were not limited to simple sentences but more complex sentences. Fraser, Bellugi, and Brown (1963) found that the ability of the children to “imitate was superior to their ability to comprehend, and their ability to comprehend was superior to their ability to spontaneously produce sentences” (Samuels, 1967, p. 113). Ervin (1964) found that imitation and comprehension were equivalent (Samuels, 1967) but Menyuk (1963) found that sentence length was not critical when meaningful sentences were used and when the material was engaging to the child.

A misconception that educators often make is that saying or repeating a word leads to having deep, semantic knowledge of that word. Simply echoing a language structure does not indicate the individual has acquired the underlying concept which is represented by the word (Arwood, 2011; Fraser, Bellugi, & Brown, 1963; Searle, 1979; Vygotsky, 1962). Fraser, Bellugi, and Brown (1963) state, “imitation is a perceptual-motor skill that does not work through the meaning system” (p. 133). Vygotsky (1962) states, “certain thoughts cannot be communicated to children even if they are familiar with the necessary words” (p. 7). Searle (1979) states that “literal meaning of a sentence needs to be sharply distinguished from what a speaker means by the sentence when he utters it to perform a speech act, for the speaker’s utterance meaning may depart from the literal sentence meaning in a variety of ways” such as in
metaphors or the utterance meaning may mean the opposite such as in ironies (p. 117). Additionally, most curricula have been designed by a predetermined order of instruction (Arwood, 2011; Dutro & Collins, 2011; Foster, 2013; Holdaway, 1979; Kozol, 2005b; Murnane, Sawhill, & Snow, 2012; Owens, 2010) that focuses on dividing out the language structures systematically taught in a predetermined sequence with the assumption that students will understand the whole of the language by learning the structures of the language (Gardner, Cihon, Morrison, & Paul, 2013; Krashen, 2002; Missett & Foster, 2015).

Since the 1950s and 1970s, most language studies revolved around learning the surface structures of the language and many researchers attempted to describe the origin of language structures and their foundations (Chomsky, 1957; Greene 1975; Katz & Fodor, 1963; McCawley, 1976). Then, in the 1970s, Lenneberg (1967) recommended a biological approach to language acquisition. By the 1980s, language researchers (Lucas, 1980), started to shift in trying to understand the underlying neurobiological meaning of the surface structures; but, brain-imaging technology was not available until the 1990s. Language experts agreed that understanding the deep structures of a language was critical for understanding the functional use of the language (Bruner, 1975; Clark, 1977; Halliday, 1977; Vygotsky, 1962).

**Language Theory and SLA Pedagogical Shifts**

Cohen and Stemmer (2007) believed that the invention of language was the catalyst that advanced the ability of humans to express themselves through symbols. Vygotsky made the connection between thought and language through the child’s social experiences and resulting intellectual growth and claimed that “thought
development was determined by language…by the linguistic tools of thought and by the sociocultural experience of the child…the child’s intellectual growth is contingent on his mastering the social means of thought, that is, language” (p. 51).

But how does the child acquire the thought and the language? Halliday (1970), Wilkins (1976), and Widdowson (1978) examined the purpose of thought in the process of language acquisition. Goodman and Goodman (1990) described language acquisition as the result of tension between invention and convention. As children used language in different contexts, they modified their inventions in light of the interactions and signals they received from the community. Freeman and Freeman (2004) stated, “Each community has a conventional way to use language” (p. 10). Therefore, each child has not only a social way to interact within a community but a community assisting in the process of acquisition. For example, a child utters the word “baba” and the parent hands the child a bottle filled with milk. This interaction between child and parent is an example of a learner acquiring meaning and the adult assigning meaning (Arwood, 1983; Bruner, 1975; Dore, 1974) to the behavior.

The function of language is described as how the structures of language are used to form a whole act of communication to include thinking, deep semantics, semiotics, and pragmatics (Arwood, 2011; Halliday, 1975; Peirce, 1894). Specifically, language acquisition is defined as the underlying thinking or cognitive representations that are acquired through socio-cognitive and neurobiological processes (Arwood, 2011; Pulvermüller, 1999). Language structures represent a conventional form of expression, whereas language functions represent a person’s deep, underlying thinking as a product of the language acquisition (Dore &
McDermott, 1982; Halliday, 1976; Searle, 1969). Understanding the difference between language structure and language function is critical for this study since most research around SLA “uses grammar as a tool to gain insights into second language learning processes” (Byrd, 2005, p. 545; Doughty & Williams, 1998b). Therefore, Heritage, Walqui, and Linquanti (2015) strongly recommend educators shift instructional practices from establishing separate objectives for language and content learning to establishing objectives that integrate language and content learning, from viewing language acquisition as structural in nature to understanding the complexity of language function processes.

**Integrating Language and Content Learning.** To integrate language functions into content, an understanding of what language functions represent within language acquisition is discussed in this section. Language functions are greater than the sum of their developmental patterns of language structures (Arwood, 2011; Dewey, 1910; Peirce, 1902). Language functions are comprised of different semantic relationships that children create socially and cognitively from the world around them. Children communicate about themselves in relationship to their environment and they think about the way they act in relationship to the agents, actions, and objects they have access to in their environment (Arwood, 2011). Therefore, children’s actions are social in nature because the acts are in relationship to others as well as to the child. The actions change dependent on the social settings. Therefore, language functions are relational as well as situational and dependent on the use of the language in the environment (Arwood, 1991; Halliday, 1977; Tomasello, 2004; Vygotsky, 1962), which are acquired by socio-cognitive and neurobiological processes. Language
functions represent these external as well as internal deep integration of learning to think and use language. Lessons that integrate the acquisition of language as a way to better think about content follows the ANM.

However, the current paradigm of SLA has a tendency for ELD teachers to state the content objectives of a lesson, which is often linked to grade level standards separately from the language objectives, often the language structures that teachers are encouraged to observe. However, this leads to dichotomous approaches that make it difficult for students to transfer their knowledge across situations (Heritage, Walqui, & Linquanti, 2015). Separating out language from content learning assumes that language is acquired through the structures of language and that by highlighting these structures; students will be able to use the structures appropriately when learning the content. However, Peirce (1905) describes the whole of a language as the sum of its parts, meaning that the function of the language that represents the underlying acquisition of meaning is greater than the surface structures of language.

**Language Acquisition as a Process.** The function of language allows children to problem solve, to think critically, to create new tools, to create new artifacts, and to communicate. From the very beginning forms of communication, children are able to express their needs and wants so the function of language also meets a specific need (Arwood, 2011; Halliday, 1977; Searle, 1970; Vygotsky, 1962). This means that children use language dependent on the meaning others assign to make sense of the connection between the child’s actions and language used (Halliday, 1977; Vygotsky, 1962). Therefore, rather than conceptualize language acquisition in terms of the
structures of language, Heritage, Walqui, and Linquanti (2015) recommend a shift to viewing language acquisition as a process and as action.

Using Complex, Amplified Texts. As children age, the function of language becomes more complex and therefore, the function of language expands socially and cognitively allowing children to think critically and to problem solve. As children acquire more functional language through use and social interaction, they are able to comprehend more expanded language functions such as displacement, semanticity, flexibility, productivity and redundancy (Arwood, 2011). The implication for educators, particularly educators of ELs, is that pedagogical practices need to shift from using simple or simplified texts to using more complex, amplified texts that get students to think critically in order to expand their language functions and ultimately, their comprehension of texts (Heritage, Walqui, & Linquanti, 2015). Overall, the process of acquiring language, through the function and not structure of language, is a neurobiological process that involves making meaning and forming concepts through social interaction or socio-cognitive processes (Bruner, 1975; Halliday, 1975; Lenneberg, 1962; Pulvermüller, 2013; Tomasello, 2003).

Neuroscience and SLA Pedagogical Shifts

In the last decade, there has been an “explosion” in neuroscience research examining the early processing of language in young children (Kuhl, 2010). “Neuroscience on early language learning is beginning to reveal the multiple brain systems that underlie the human language faculty” (Kuhl, 2010, p. 713). As mentioned previously, early studies of neuroscience assumed there were specific brain regions that generated semantic meanings from sensory input and specific regions that
processed language (Baars & Gage, 2010; Ghazanfar & Schroeder, 2006; Klemen & Chambers, 2012; Price, Crinion, & MacSweeney; 2011). This interpretation used the definition of language as discrete additive structures. However, other studies have been released indicating multiple areas of the brain are responsible for language processing and language acquisition (Bookheimer, 2002; Vigneau et al., 2006; Kuhl, 2010; Pulvermüller, 1999). This paves the way for a new way of thinking about how language is acquired; as it is possible language is acquired neurobiologically through a set of interdependent semantic processes.

In the context of SLA, Heritage, Walqui, and Linquanti (2015) proposed a number of shifts that align with the neuroscience literature and that supports the notion that language is acquired neurobiologically. Examples of this alignment include a shift toward delivering lessons focused on a cluster of lessons centered on texts that are interconnected by purpose, meaning, or by theme rather than lessons focused on individual ideas. Also, scaffolding the content for students to increase autonomy rather than just preteaching content aligns with key research from the field of neuroscience. Other examples of alignment include viewing language acquisition as a social process, teaching in multimodal ways, and approaching language acquisition in a non-linear, complex manner.

**Cluster of Lessons.** If synchronous neuronal activity is present, neurons that may be located in different cortical areas of the brain become strongly associated and connected even, if they are located far apart (Pulvermüller, 1999). These neurons will act as one cluster or cell assembly (Pulvermüller, 1999). If these neurons are stimulated by sensory input or sensory fibers the entire cluster of neurons will be
activated and stronger connections and clusters are made (Pulvermüller, 1999).

Neurons that are related to a specific word form become active when the neurons of the underlying meaning of this word form are connected. In other words, if the co-activation between word form and meaning occurs frequently, this overlapping process will change the assembly of the word form into higher-order assembly or concepts (Pulvermüller, 1999). These interconnected cell assemblies form neuro-semantic circuits (Pulvermüller, 2016). This word form and meaning co-occurrence is necessary in order for acquisition to take place but only until the bond is strong then part of the cluster of word form and meaning can be activated (Pulvermüller, 1999). This means that a word could have multiple points of access based on neuro-semantic processing. When the form and meaning interconnect, then a “word” can be accessed in multiple ways. This finding by Pulvermüller (1999) provides evidence that supports the notion that the function of language is greater than its parts.

Neuroscientists define learning as the process in which a permanent change in the capacity of a neuron occurs (Baars, 2010; Pulvermüller, 2005). This happens when a single neuron fires and seeks to make neural connections to stimulate a chemical change (Baars, 2010; Pulvermüller, 2005; Thompson, 1986). The overlapping of these chemical changes form circuits of connections when the neuronal clusters interconnect. When neurons fire, they release neurotransmitters to another neuron strengthening the connections (Baars, 2010). When these chemical changes occur, neurons are permanently changed. There is evidence to suggest that when input is repeated, it does not stimulate or ignite the firing of neurons (Oswald, 2014). Repetitioni of the same input does not improve brain activity. Learning occurs when
there is a permanent change of a neuron and the input has to be meaningful in order for neurons to fire and wire together (Baars, 2010). Therefore, when learning occurs, “neuro-chemical communication between neurons is facilitated” creating a network of connections not only between adjacent neurons but also between distant neurons (Genesee, 2001, p. 155; Just, Cherkassky, Aryal, & Mitchell, 2010; Plebe & De La Cruz, 2016; Pulvermüller, 1999; Pulvermüller, 2012). This neuro-chemical communication between neurons gave rise to a fairly new terminology within the field of neuroscience called neuro-semantics, which is concerned with the meaning of the electrical and chemical activity in the neural networks or neuro-semantic circuits and networks as well as the meaning of language in terms of the neural computations performed by language learners (Plebe & De La Cruz, 2016). The neural cell assemblies form circuits for images or concepts, interconnecting again to form networks for language function with multiple points of access.

**Scaffolding and Language Acquisition.** Pulvermüller (2003) states “Linguistics is the study of language. Language is a system of brain circuits. If linguistics is the study of language and language is in one sense a system of brain circuits, one would expect linguists to be open to the study of brain circuits” (p. 270). The brain is the focal point of learning and is considered the organ of learning (Baars & Gage, 2010; Scalise & Felde, 2017; Whitman & Kelleher, 2016). Therefore, teachers are often referred to as brain changers (Whitman & Kelleher, 2016) since through the process of learning, the brain changes its physical structure at a variety of cellular levels (Baars & Gage, 2010; Scalise & Felde, 2017). This process of change involves neuroplasticity or “brain plasticity” in which the brain modifies its neural
structure over time as functions change (Baars & Gage, 2010; Draganski, Gaser, Busch, Schuierer, Bogdahn, & May, 2004; Scalise & Felde, 2017; Whitman & Kelleher, 2016). These brain changes suggest that functions are more important than the structures. Whitman and Kelleher (2016) define neuroplasticity as the process of rewiring the brains of students to improve their performance in school.

Neuroplasticity allows the brain to change, which in turn helps the brain better cope when encountered with new situations (Scalise & Felde, 2017). Therefore, activities that scaffold students’ acquisition of meaning, in multiple ways will modify the neural structure of the brain.

Language Acquisition as a Social Process. Osterhout, Poliakov, Inoue, McLaughlin, Valentine, Pitkanen, Frenck-Mestre, and Hirschensonh (2008) also found that learning a second language mediated changes in the brain, specifically, the electrical activity, location, and structure of the brain. This aligns with earlier claims that experience has the ability to change both the function and the structure of the brain (Genesee, 2001; Münte, Altenmüller, & Jäcke, 2002; van Praag, Kempermann, & Gage, 2000). Therefore, acquiring a language, including a second language is a natural phenomenon and occurs without intervention (Genesse, 2001). Genesse (2001) continues to state that by “understanding how the brain learns naturally, language teachers may be better able to enhance their effectiveness in the classroom” (p. 154). The strategy proposed by Heritage, Walqui, and Linquanti (2015) is a shift in thinking that language acquisition is not an individual process but a social process that involves many different levels of interaction so students are able to gain the experience needed to change the function and structure of the brain.
Multimodal Instructional Practices. Also, acquiring another language and multilingualism produces more brain activity than monolingual brains as multilingualism enhances the development of executive control functions in which the frontal lobe regions of the brain responsible for inhibition, monitoring, and switching the focus of attention help during problem solving (Bialstok, Craik & Freedman, 2007). The bilingual advantage is most evident in bilinguals who acquire advanced levels of proficiency in both languages and use both languages actively on a regular basis (Bialstok, Craik & Freedman, 2007). This supports the other brain literature that suggests that multiple ways to function with language (multi-lingual processes) actually increases brain function. The age of dementia onset for bilinguals was between four to five years later than it was for monolinguals (Bialstok, Craik & Freedman, 2007).

Recent studies using fMRI with early bilinguals found little evidence for separate neural systems (Hernandez, Dapretto, Mazziotta, & Bookheimer, 2001) for different languages. This indicates that for early bilinguals, the same areas of the brain are activated when learning more than one language at an early age. This suggests again that the processes of acquisition are more important for the acquisition of language than teaching the different parts of the second language. Also, Braver, Barch, Kelley, Buckner, Cohen, Miezin, Snyder, Ollinger, Akbudak, Conturo, and Petersen (2001) found that switching between first and second languages in early bilinguals in a study that required subjects to name pictures in one language showed increased activity in the Dorsolateral Prefrontal Cortex (DLPFC). This process linguistically is known as tagging and retagging concepts (Arwood, 2011) as part of
the multiple access points to concepts represented by language. A similar study by Hernandez (2008) showed increased activity in the DLPFC, superior parietal lobule, superior temporal gyrus, and brain areas devoted to memory, somatosensory processing and emotion when subjects switched languages compared to the previous study that used only one language and saw activation only in the DLPFC. These results replicate previous studies that language switching activates multiple parts of the brain and “extends studies on the neural bases of bilingualism by suggesting that early bilinguals’ representation of the two languages may be mediated by neural systems not typically associated with language” (p. 1). In other words, language is a product of the systems of semantic sensory input and processing. Therefore, alternating between languages increases activation in brain structures and plays a significant role in executive control and articulatory and motor planning (Hernandez, 2009). Additionally, because ELs come with a first language, these students are able to use the acquired concepts as a basis for learning other codes or structures of languages (Arwood, 2011). Language acquisition is a complex set of both socio processes as well as of the neurobiological acquisition of semantic meaning.

**Language Acquisition as Non-Linear and Complex.** Recent studies show there are compact zones in the brain with narrow functions that interact with one another to process language and that the right hemisphere is far more involved in aspects of language processing than previously believed (Bookheimer, 2002). More specifically, the right hemisphere makes a significant contribution to language comprehension by ‘keeping track of the topic, drawing inferences from text and in conversation, and integrating prosodic information into a complete representation of
meaning and intent, aspects of language that are critical to social communication” (Bookhemier, 2002, p. 183). In a meta-analysis of the left hemisphere language areas such as phonology, semantics, and sentence processing conducted by Vigneau, Beaucousin, Hervé, Duffau, Crivello, Houdé, Mazoyer, and Tzourio-Mazoyer (2006), results revealed that language and language functions were distributed in wide networks involving multiple regions of the brain (Vigneau et al., 2006). In other words, there is no specific set of structures responsible for language function. Instead the whole brain uses multiple sets of circuits to form networks, which represent all of the functions of language. For example, the inferior frontal gyrus showed evidence of phonological and semantic processing (Vigneau et al., 2006). The cortical area in the pars opercularis in the inferior frontal gyrus showed evidence of syntactic processing (Vigneau et al., 2006). The posterior part of the superior temporal gyrus showed evidence of sentence and text processing (Vigneau et al., 2006). Therefore, language acquisition is not a linear process and strategies need to shift from seeing language acquisition as a linear process aimed at accuracy, fluency, and complexity to understanding that acquisition occurs in non-linear, complex, and interconnected ways (Heritage, Walqui, & Linquanti, 2015) as many regions of the brain are activated during the acquisition process.

Through various research methods such as imaging studies, educators were able to see a much stronger correlation between language function and brain function (Gallistel & Matzel, 2013; Göetzmann & Schwegler, 2010; Pulvermüller, 2003, 2005, 2012). Neuroscience has advanced so much that it is now possible to think critically of how the research from this field can be applied to the field of education and one
question being asked is whether it is truly ethical to ignore what is known about the brain when reflecting about education (Scalise & Felde, 2017).

Traditional approaches of psycholinguistics, neurolinguistics, and cognitive psychology in the context of SLA operated by observing linguistic behavior and patterns of behavior to infer how the brain functions (Schumann, 2004). Neurobiology, on the other hand, works in the opposite direction and uses the research on how the brain functions (neuroscience) to speculate how language is acquired (Schumann, 2004). Long (1990) argued that any theory of SLA requires the understanding and specification of well-researched neural mechanisms (neuroscience) to account for the acquisition of a second language. Schumann (2004) also states “there has been a tendency in language acquisition circles to dismiss neuroscience because, as the claim goes, supposedly not enough is known about the brain to make significant contributions to our understanding of how language is acquired. Unfortunately, such claims often reflect an overriding ignorance of underlying neural mechanisms – a dismissive attitude about the neurosciences that must end” (p. ix). Therefore, stating that language is acquired neurobiologically takes into account the neuroscience of how the brain processes language (Lenneberg, 1967; Pulvermüller & Schumann, 1994). However, this neurobiological process of language acquisition occurs in multiple levels, which is the topic of the next section.

Neuro-Semantic Language Learning Theory (NsLLT)

The NsLLT (Arwood, 2011) is based on the neuroscience of the brain, the cognitive psychology of how products arise in stages from the function of the brain, and how language function represents the deep thinking of semantic acquisition. The
NsLLT connects research literature from the disciplines of neuroscience, cognitive psychology, and language function (e.g., Damasio & Geschwind, 1984; Halliday, 1977; Pulvermüller, 2003; Sapir, 1949; Tomasello, 2004; Vygotsky, 1962).

The NsLLT is the corresponding language acquisition theory to ANM that serves as the unifying element to the three lenses of cognitive psychology, neuroscience, and language function that may be used to describe the process of learning for any student as well as the process of acquiring a language. This theory posits that “language function develops from the neurobiological acquisition of meaning” (Arwood & Merideth, 2017, p. 21). The construct “neuro-semantic” refers to the process of meaning being acquired neurobiologically (Arwood, 2011; Gallistel & Matzel, 2013; Kiefer & Pulvermüller, 2012; Pulvermüller, 2013). Additionally, the construct “language learning” in the context of the NsLLT refers to the idea that the process of acquiring a language is unique to each individual learner’s experience (pragmatics) and that the language that is acquired is representative of the deep, underlying concepts (semantics) that the individual learner has acquired to use for purpose (semiotics) (Arwood & Meredith, 2017). The NsLLT is a four-leveled learning theory where each level is dependent on the previous level and requires careful scaffolding and building from the previous levels. Each level is parallel to the available neuroscience of how we learn. The four levels are described more in depth in the next few sections.

**Sensory Input.** Sensory input is received through the five senses. This sensory input at the receptor level travels to the limbic system (LeDoux, 2003), which integrates patterns (Arwood, 2011). The ears receive sensory input from sound waves
The eyes receive sensory input from light waves that are distinct from sound waves (Arwood, 2011; Ayres, 2005; Hubel, 1988). The nose, mouth, and skin bring in sensory input from sensation (Arwood, 2011; Ayres, 2005). When the sensory receptors accept the information coming in, the sensory input is sorted into perceptual patterns (Arwood, 2011; Ayres, 2005). The brain begins to recognize these patterns. Patterns are formed by neurons firing electrical signals that activate other neurons therefore forming stronger neural networks (Arwood, 2011; Baars, 2010; Ayres, 2005). Visual input coming in from the eyes through the optical nerve activates cones and rods, which are called the photoreceptors, that make sense of the electromagnetic light waves that is bouncing off of the surface edges (Baars, 2010). These visual inputs can overlap to form visual patterns. Auditory input coming in through the auditory nerve is activated when the ears receive acoustic sound waves (Baars, 2010). If acoustic input is involved, then only when light and sound waves are integrated into auditory patterns does the brain begin to convert the sensory input into auditory perceptual patterns (Baars, 2010).

Perceptual Patterns. Perceptual patterns are the products of the sensory integration of the input (Arwood, 2011; Ayres, 2005) as “integration is what turns sensation into perception and we perceive our body, other people, and objects because our brain has integrated the sensory impulses into meaningful forms and relationships” (Ayres, 2005, p. 6). These patterns consist of specific sets of acoustic and visual patterns. The act of hearing and seeing is a representation of organized perceptual patterns in the brain as ears do not hear and eyes do not see. Seeing is the ability of a person to physically collect photons and hearing is the ability of a person to collect
acoustic elements that they make sense of from signals they receive from the environment (Baars, 2010). The primary pathway from the eyes and ears to the brain begins in the cranial nerves (Arwood, 2011; Greenfield, 1997; Howard, 2006). This organization of perceptual patterns begins in the midbrain and when a learner is able to use oral language to articulate what they can hear and see, this is a function of language (Lenneberg, 1962; Tomasello, 2004; Vygotsky, 1962) that occurs at the cortical level of the cerebrum (Baars, 2010).

**Concepts.** Concepts are formed through the layering of perceptual patterns (Amari, 1977; Arwood, 2011; Syder, Bossomaier, & Mitchell, 2004) to form neuro-semantic circuits. Concept formation occurs when neurons fire creating networks of neurons that fire together therefore strengthening the connections between the synapses (Baars, 2010: Bookheimer, 2002). As the learner forms more patterns creating more neural networks, this creates a pathway for the brain to layer the information (Ayres, 2005). Layering in the brain occurs as neural circuits begin to inhibit and integrate new signals allowing the circuits to overlap and cross through multiple relay stations in the midbrain to form cortical networks of circuits (Arwood, 2011; Pulvermüller, 2005). These pathways through the cortical regions create synchronous dorsal and ventral streams (circuits) activating the prefrontal cortex as well as providing feedback to other regions of the brain. This inhibition/integration of perceptual patterns layering to form concepts through neural networks is a representation of the structure of language (Pulvermüller, 2003). In other words, the function of language forms the structures of language and the structures change in relationship to the functions (Bookheimer, 2002; Pulvermüller, 2003). This formation
of cortical circuits represents the process of language acquisition for any learner (Arwood, 2011; Gallistel & Matzel, 2013; Pulvermüller, 2005).

**Language Function.** There is more to the process of language acquisition than the neural structures of the brain that take in sensory input to form patterns and then concepts. Language function is what separates ANM from other neuroeducation models. As mentioned in previous sections, the current paradigm of SLA typically defines language in terms of its surface structures or forms rather than its functions or use (American Speech-Language Hearing Association, 1993; Chomsky, 1968; Wilson, Blackmon, Hall, & Elcholtz, 1991). Language function is represented by a tiered system of circuits and networks used to name the neuro-semantic images as meaningful (Arwood, 2011). Therefore, language acquisition is neurobiological in nature. But, there is a plethora of research suggesting that language is not acquired without social interaction (Arwood, 2011; Carroll, 1964; Halliday, 1977; Lenneberg, 1969; Tomasello, 2004; Vygotsky, 1962). Therefore, language function describes how the brain functions socially. In other words, language has to be acquired. In order to understand the brain and mind in terms of learning, one must understand how language is used to interpret one’s environment. Language mediates literacy, the ontogeny of language, value (semiotics), meaning (semantics), and interpersonal communication (pragmatics) and not just the surface structures of language (Arwood, 2011). Although there have been attempts by scientists to connect the mind and brain, what is left out of the mix is language and the understanding that language helps form concepts and is the vehicle for communication (Arwood, 2011). Miller (1990) states that:
One of the psychologists’ great methodological difficulties is how they can make the events they wish to study publicly observable, countable, measureable. It is significant to note that the device most often used for conversion from private to public is language. Thus speech is a crucial problem for psychology. None of their other activities gives the same sort of insight into another person as does their language. Since people spend so many of their waking hours generating and responding to words, and since speech is such a typically human mode of adjustment, no general theory of psychology will be adequate if it does not take account of language. (p. 66)

The NsLLT provides the final piece to the puzzle, which is language function. It provides the experience needed for language acquisition that Dewey argues is critical to the learning process by changing the way language is taught. It incorporates Vygotsky’s social interaction theory and the understanding that social interaction through language is needed for the formation of concepts. The NsLLT also weaves in Bruner’s theory that language is a social action and it is a way of passing on knowledge. It is the only theory to date that can be used to describe the process of language acquisition as well as how learning takes place by connecting the function of language to the neural structures and functions of the brain.

The NsLLT provides a rationale for a clear understanding of how students acquire a language. The dilemma in the field of SLA is the lack of a common philosophy or theoretical foundation for how language is acquired which leads to a scattered approach to language acquisition (Atkinson, 2011; Heritage, Walqui, & Linquanti, 2015; VanPatten & Williams, 2015). This may be due to a lack of
understanding of how language is acquired, which is often confused with how language is developed. The difference between language development and language acquisition is the topic of the next section.

**Language Development and Language Acquisition**

The use of the terms language development and language acquisition to describe the process of learning a language has been debated for many years. Linguists would agree that using the right terminology, development or acquisition, makes a big difference (Larsen-Freeman, 2014). Understanding when it is appropriate to use either development or acquisition is important since language is used to both construct and reflect thoughts (Larsen-Freeman, 2014). With a variety of different constructs, new ideas, perspectives, and awareness arise (Larsen-Freeman, 2014). Therefore, acquiring a language is about how children create meaning (neurobiologically and socially) that becomes surface forms (Arwood, 2011; Halliday, 1975; Bruner, 1975; Peirce, 1878).

Kennison (2013) describes *language development* as a set of stages of specific developmental products beginning with a stage of preverbal communication where infants use gestures and vocalizations to make sense of the world around them and then as new forms are learned, these new forms replace old forms so that children learn new words that allow them to express the same communicative functions previously expressed but in different ways. Thus, language development can be observed in the learners’ forms of communication across stages.

Friederici (2011) defined *language acquisition* as a process where humans obtain the capacity to perceive and understand language and produce and use words
and sentences to communicate. Bruner (1972) defined \textit{language acquisition} as a process through which humans acquire the cultural and linguistic conventions of the language into a world in which they were born. Bruner (1971) posited that children acquired language through engaging in routine interactions with adults in that culture such as nursing, eating, bathing, sleeping, dressing, undressing, playing, and using language. For Bruner, humans were not innately equipped with a device and a universal grammar but instead, they acquired language through social interaction.

From a linguistic perspective and complexity theory lens, the term acquisition was believed to mean something that was taken in that moved from external to internal which was an act or the process of obtaining or getting (Larsen-Freeman, 2010). Development, on the other hand, meant that each learner had “the capacity to create his or her own patterns with meanings and uses (morphogenesis) and to expand the meaning potential of a given language, not just to internalize a ready-made system” (Larsen-Freeman & Cameron, 2008, p. 116).

In second language acquisition (SLA), the term development also had been used synonymously to learning (Freeman & Freeman, 2004) hence the shift from identifying a student as limited English proficient (LEP) to English Language Learner (ELL) to now English Learner (EL). Therefore, language learning had been differentiated from language acquisition in the same way linguists were differentiating between acquisition and development. Learning implied a fixed skill whereas acquisition referred to the process in which the language was learned. Krashen’s theories implied a rigid separation of acquisition and learning in the context of
memory stores and speech production (Nagle & Sanders, 1986). Bialystok (1978) preferred to use the terms implicit and explicit instead of acquired and learned.

There is another perspective on the difference between language development and language acquisition from a neuroeducation lens, which serves as the lens through which this study operated. The lens through which learning and language acquisition are viewed impacts classroom practice, especially for language teachers. For programs designed for ELs, the term language development and language acquisition makes a significant difference in how programs are designed to serve these students to help them reach proficiency in the language. Therefore, for the context of this study, the term language development is used to describe the observable surface language structures or products that are learned over a period of time in stages where language tasks are chunked into various proficiency levels and where the method of human communication, either spoken or written, consists of the use of words in a structured and conventional way. Additionally, language development is used to refer to strategies and concepts that are heavily influenced by behaviorist and cognitivist approaches that Heritage, Walqui, and Linquanti (2015) have recommended a shift away from. The pedagogy of language development within stages emphasizes directly/explicitly teaching the structures of language, emphasizing sheltered instruction strategies that focus on discrete structures of language for focusing on four language modalities (reading, writing, speaking and listening), and the transference of one language set of structures to the development of another language. Contemporary research around the concept of translanguaging (Flores and Schissel, 2014; Otheguy, García, & Reid, 2015) supports the shift from seeing language learning, a
developmental linear process to a non-linear and complex set of processes (Heritage, Walqui, and Linquanti (2015). The developmental approach to language learning suggests that environmental exposure to a language will develop language. For example, sheltering instruction (e.g., Sheltered Instruction Observation Protocol (SIOP) (Echevarria, Vogt, & Short, 2008) framework) outlines a list of components including instructional techniques that make content comprehensible for students so they are able to develop academic English while learning content (Echevarria, Vogt, & Short, 2008; Goldenberg, 2008). This process of applying instructional methods embedded or sheltered within the content operates under the assumption that SLA occurs when students are able to approximate models of language chunks when educators use a combination of reinforcement, modeling, prior knowledge, and comprehensible input strategies. This type of pedagogy requires an internal response to outside teaching of the language. This outside teaching may or may not set up opportunities for learners to acquire the concepts underlying language structures. Heritage, Walqui, and Linquanti (2015) proposed a shift toward integrating content and language objectives in the hopes of making the language teaching process more natural. Integration with emphasis on the learner and not on the content might provide more acquisition. On the other hand, emphasis on language structures within content suggests specific brain structures are responsible for written, spoken language development. This approach is not complete. Current neuroscience findings report widespread distributive language brain networks, not specific brain structures being responsible for separate and distinct language structures (Bookheimer, 2002).

The environment has a critical impact on student language learning and could
be placed under development or acquisition. However, if the assumption is that by mere exposure to a language, language acquisition occurs; then this concept is related to the assumptions of language development. The assumption is that students develop language through hearing and seeing discrete structures of the language or that language needs to be taught in a formal setting (to include informal) such as grammar and structures of the language because children have some innate mechanism for language. Furthermore, from a cognitive psychology lens, the attitudes of older students can be influenced by second language learners’ attitudes (Gardner and Lambert; 1959, 1972). Literature from a neuroeducation lens supports the idea that the student’s environment makes a difference in the student’s acquisition of language; and, although exposure can help, students also have to engage in social activities that help them make meaning of their environment. Researchers suggest that students acquire concepts neurobiologically named by language through interacting with others, within a social-cognitive set of processes (Arwood, 1983; Bruner, 1972; Carroll, 1964; Dewey, 1910; Halliday, 1977; Peirce, 1878; Sapir, 1949; Searle, 1970; Tomasello, 2001, 2004; Vygotsky, 1962, 1978, 1986; Wertsch, 1991). The socio-cognitive external processes result in a learner’s internal set of individual, neurobiological, language acquisition processes. Schulze (2015) reports that teachers are not equipped to teach language and research indicates that if teachers have a strong knowledge base of language acquisition, academic language, including the grammar, vocabulary, and discourse structure of the texts that typically appear in the content they are teaching, they will be better equipped to design lessons that are focused on language acquisition and that the acquisition of such concepts scaffold to accelerate
the academic literacy of ELs as well as their social conceptualization (Fenwick, Humphrey, Quinn, & Endicott, 2014; Gebhard, Willett, Jimenez, & Piedra, 2010; Schleppegrell, 2012).

The term *language acquisition* is used in this study to describe the neurobiological processes of acquiring a language through the four levels of the neuro-semantic system. Language is then used to communicate thinking, the understanding of deeper underlying concepts. Therefore, language acquisition is dependent on the cultural and linguistic environments of students (Bruner, 1972; Hoover, Baca, & Klinger, 2016; Vygotsky, 1962) as well as the learner’s internal neurobiological processes. Given this definition of language acquisition, this research assumes that *language acquisition* methods should align with the Neuro-Semantic Language Learning Theory (NsLLT).

**Neuroeducation Paradigm Shift in the Context of SLA**

There is literature within the three lenses of ANM supporting a shift toward understanding language acquisition as a social process, understanding that acquisition occurs in non-linear ways, and understanding that concepts have to be neurobiologically scaffolded. This aligns with Battro’s (2005) description of neuroeducation:

Education is about culture, and culture is embodied in the individual. Neuroeducation deals with the embodiments of culture in our brains during the entire life span of a person. Neuroeducation is a trans-disciplinary field, with many actors and institutions involved. The diversity of approaches, techniques
and programs reveals a bright and large spectrum of interests that should be preserved and enhanced. (p. 1)

Similarly, the field of SLA is grounded not on one SLA theory but on many theories and approaches focused on cognitivism (Atkinson, 2011; Heritage, Walqui & Linquanti, 2015; VanPatten & Williams, 2015), which results in a developmental paradigm that needs to shift toward processes of acquisition (Heritage, Walqui, & Linquanti, 2015). Reaching out to a multidisciplinary approach to learning language through the neuroeducation model that includes language (ANM) may provide the literature for a shift.

**Paradigm Shift**

Kuhn (1970) pioneered the definition of the word paradigm to mean a pattern or a model. He argued that change in the sciences did not involve a step-by-step process but rather new paradigms emerged by tradition-shattering revolutions that occurred in the professional community (Jacobs & Farrell, 2001). According to Ausubel (1968), we use paradigms or patterns to understand the situations we are in and to help build links between the events that occur in the world around us. Maurizio (1983) states that a paradigm is not merely influential to a society but that it actually “becomes its guiding force, it sets its goals, and it determines its moralities as well as the society’s concepts of wealth, power, status, employment, recreation, value systems, and even religion” (p. 20).

The term “paradigm shift” has been used in many sciences to include education to describe a different way of thinking or a different perspective. When a paradigm shift occurs, we tend to see things in a different light, which prompts a
behavior change or a change of focus on different aspects of the phenomena.

Paradigm shifts in education have evolved over the last hundred years and have typically taken many years to fully enact these shifts.

The paradigm shifts in education of the twentieth century were greatly impacted by the philosophical shift from positivism to post-positivism (Berman, 1981; Capra, 1983; Merchant, 1992). Positivism emphasized parts and decontextualization, separation, the general, concerned more with the objective and what was quantifiable, relied on experts and outsider knowledge where the researcher was from an external source, focused on control, top-down practices, attempted to standardize, and focused heavily on the product (Jacobs & Farrell, 2001). Post-positivism, on the other hand, emphasized the whole and contextualization, integration, the specific, subjective and the non-quantifiable (qualitative), considered the “average” participant and insider knowledge where the researcher was internal, focused on understanding, bottom-up, appreciated diversity, and focused on the process as well as the product (Jacobs & Farrell, 2001).

Understanding the broader shift from positivism to post-positivism allows us to understand the shifts that take place in any other field such as SLA. In SLA, the main paradigm shift occurred over forty years ago with the flow of shifts from positivism to post-positivism. The second language field moved away from behaviorism and structural linguistics toward cognitive, socio-cognitive psychology and more contextualized, meaning-based approaches to language acquisition (Jacobs & Farrell, 2001). The key components of the shifts in SLA outlined by Jacobs and Farrell (2001) concerned 1) focusing greater attention on the learner as an agent and moving away
from teacher-centered practices to more student-centered practices, 2) focusing greater attention on the process of learning a language rather than the products of the language, 3) focusing greater attention on the social nature of learning and acknowledging students as agents rather than students as separate from the learning, 4) focusing greater attention on the diversity of learners and differentiating for the individual language learner, 5) focusing greater attention on the views of those working in classrooms and seeking input directly from language teachers and learners versus an outside researcher, 6) focusing greater attention on holistic learning and how language learning applies to the outside world, 7) focusing greater attention on helping students develop their own purposes for learning a language, 8) focusing greater attention on a whole-to-part approach to teaching language by using meaningful texts and helping students understand the functions of the words in context, 9) focusing greater attention on the importance of meaning rather than activities that focus on drills and rote learning, and 10) focusing greater attention on the process of learning a language rather than learning for the purpose of taking an exam. These ten suggestions are parallel to the Heritage, Walqui, and Linquanti (2015) suggestions. Oprandy (1999) compared the current paradigm in SLA to city planning and writes:

The communicative approach requires a complexity in terms of planning and a tolerance for messiness and ambiguity as teachers analyze students’ needs and design meaningful tasks to meet those needs. The pat solutions and deductive stances of audiolingual materials and pedagogy, like the grammar-translation texts and syllabi preceding them, are no longer seen as sensitive to students’ needs and interests. Nor are they viewed as respectful of students’ intelligence
to figure things out inductively through engaging problem-solving and communicative tasks. (p. 44)

Heritage, Walqui, and Linquanti (2015) also addressed paradigm shifts that support the learning of ELs. Due to the complexity and shift in college and career standards that have engulfed education in the United States, the demands of language teachers have also increased and required more of teachers to meet the needs of ELs in the classroom. Heritage, Walqui, and Linquanti (2015) outlined a series of shifts in the design of materials and instructional approaches when teaching ELs that are similar to the shifts outlined above.

And, the theoretical underpinnings of ANM align well to the post positivism tenets outlined by Jacobs and Farrell (2001) and the pedagogical shifts recommended by Heritage, Walqui, and Linquanti (2015).

ANM creates a strong bond between studies of the mind, brain, and language, which may help educators apply theory to language acquisition. Battro (2005) states that:

Neuroeducation is changing dramatically because some new brain imaging technologies are becoming portable, non-invasive and accessible to teachers in the classroom, the way computers have been introduced in schools and homes some two decades ago. In fact several initiatives are unfolding around the world to bridge the gap between the most advanced neurocognitive sciences and the theory and practice of education in local contexts. (p. 1)

Arwood’s Neuroeducation Model provides the framework for triangulating three disciplines, cognitive psychology, language, and neuroscience. The NsLLT
offers the theory that connects the mind, brain, and language and outlines how students acquire language neurobiologically. There are many theories that teachers learn throughout their teacher education programs as preservice teachers and the previous sections have outlined the theory to practice gap we see in classrooms. However, there are several strategies that have been implemented using the NsLLT lens that have proven to be successful, particularly with ELs (Arwood & Robb, 2008; Robb, 2016). Most approaches today still emphasize cognitivism but as Heritage, Walqui, and Linquanti (2015) suggest, there should be a shift. One approach to SLA has gone beyond the shift recommendations by Heritage, Walqui, and Linquanti (2015). This approach is called the Neuro-Viconic Education System (NvES). This next section will provide a foundation of support for the NvES. ANM and the NsLLT take into account the neuroscience of learning (language), the purpose of language or the naming of thinking (function), and offer support for the distinction between language acquisition and language development. The NvES recommends several shifts in SLA and shows promise as an effective approach.

**Neuro-Viconic Education System (NvES)**

The NvES is based on the NsLLT as a holistic approach designed to meet the needs of the individual learner (Arwood & Rostamizadeh, 2016) grounded by theory and effective practices, developed over 45 years. This system rests on four principle beliefs: 1) All learning is brain-based, 2) All children learn to think, 3) All children learn to be pro-social, and 4) All children learn through context (Arwood & Rostamizadeh, 2016). The translation of these beliefs to individual learners’ needs supports the post-positivism tenets mentioned previously. These tenets call for a shift
toward focusing greater attention on the individual learner as an agent, focusing greater attention on holistic learning, and how language acquisition occurs in context.

NvES sets up a language acquisition paradigm that allows language acquisition to move away from: 1) products to a focus on processes, 2) development to a focus on learning, 3) teacher-based practices to a focus on more student-based practices, 4) additive parts, low context to a focus on whole events, high context, 5) controlling to a focus on empowering, 6) the mind to a focus on the brain, 7) testing to a focus on assessment and content, 8) patterns to a focus on concepts and language, 9) skills to a focus on literacy and synergy, 10) the limbic system of the brain to a focus on the cerebral cortex and neural track circuits and networks of the brain, 11) parts to a focus on the whole, 12) rewards/punishers to a focus on refining thinking (knowing why and how), and 13) approval of what’s to a focus on acceptance of who’s.

In a five-year study conducted by Arwood and Robb (2008), the researchers used a variety of NvES instructional strategies that align well with the literature on the NsLLT such as viconic language methods, hand over hand, I stories, flowcharting, and asking “why” questions so students are able to develop their oral skills. Along with these strategies, the researchers collaborated throughout the study so there was a connection between theory and classroom practice. In the first year of the study, 29% of the 32% ELs reached literacy benchmarks. In the second year 83% of ELs met literacy benchmarks. In year three of the study, 90% met and/or exceeded state standards and in year four 100% of ELs ended the year at grade level or higher. In the final year of the study, 100% of ELs made grade level benchmarks as in the previous year (Arwood & Robb, 2008; Robb, 2016). The findings and results of this multi-year
study suggest an impact of neuroeducation on ELs.

Most approaches still used today as described previously use either a behaviorist or cognitive psychologist lens with the exception of NvES. The approaches vary depending on the training and PD provided to teachers. However, there is widespread research on the impact of teachers’ personal and professional theories on classroom practice, which leads to the next section that will investigate how teachers’ beliefs impact the ability of educators to convert theory to practice.

**Analysis of Educators’ Beliefs and Classroom Practice**

This study looked at educators’ beliefs around language acquisition and language development with and without professional development on this topic. These educators included teachers, school psychologists, speech language pathologists, administrators, and self-contained teachers who serve ELs. The next few sections will provide the literature on the complexity of teachers’ beliefs and how these beliefs impact practice as well as teacher change and how the process of innovation impacts language teacher development. Additionally, the sections will include how teacher education programs are designed and what they are missing in preparing student teachers for the complexity of classroom life, which impacts their attitudes and beliefs.

**Teachers’ Attitudes and Beliefs**

There is a growing body of research stating that both attitudes and beliefs drive classroom actions and influence the teacher change process and that teacher education programs should be designed to help prospective and in-service teachers develop their thinking and practices (Nespor, 1987; Pajares, 1992; Peck & Tucker, 1973; Richardson, 1994b, 1996). Therefore, the role of teacher attitudes and beliefs in the
education of teachers is two-fold: “1) as facets of individual preservice and in-service teachers that affect the way they process new information, react to the possibilities of change, and teach; and 2) as the focus of change in teacher education programs” (Richardson, 1996). In order to realize the roles of attitudes and beliefs, there needs to be a thorough investigation of how attitudes and beliefs are defined and how they impact classroom practice.

Richardson (1996) through a review of the literature found there were similarities and differences between attitudes and beliefs. A similarity is that attitudes and beliefs are a group of constructs “that name, define, and describe the structure and content of mental states that are thought to drive a person’s actions, which includes conceptions, perspectives, perceptions, orientations, theories, and stances” (Richardson, 1996, p. 102). Attitude, on the other hand, is defined as “a mental and neural state of readiness, organized through experience, exerting directive or dynamic influence upon the individual’s response to all objects and situations with which it is related” (Allport, 1967, p. 8). Beliefs are defined as “psychologically held understandings, premises, or propositions about the world that are felt to be true” (Richardson, 1996, p. 103) or propositions held to be true and are “accepted as guides for assessing the future, are cited in support of decisions, or are referred to in passing judgment on the behavior of others” (Goodenough, 1963, p. 151). However, the differences between the two terms appeared to be vague in the literature. For example, Rokeach (1968) defined attitudes as “a relatively enduring organization of beliefs around an object or situation predisposing one to respond in some preferential manner” (p. 112), which included aspects of beliefs in the definition. Then, Eisenhart,
Shrum, Harding, and Cuthbert (1988) included aspects of attitudes in Goodenough’s (1963) definition of beliefs, which stated that “a belief is a way to describe a relationship between a task, an action, an event, or another person and an attitude of a person toward it” (p. 53). Despite the numerous studies on attitudes and the impact of attitudes on classroom practice, the fields of social and educational psychology have shifted the focus of attitudes out of the limelight. This is due mostly to the fact that “many of the studies so far have not produced significant results” (Getzel & Jackson, 1963, p. 579). The shift was now on teacher beliefs and how beliefs impact actions, or classroom practice.

“Teachers’ beliefs are inextricably complex, and, thus, equally difficult to unpack” (Johnson, 1994, p. 439). Cognitive psychologists define beliefs as a person’s representation of reality that guides both thought and behavior (Anderson, 1985; Abelson, 1979). Rokeach (1968) described beliefs as containing a cognitive, affective, and behavioral element, and, therefore, influences what one knows, feels, and does. Nisbett and Ross (1980) stated that human perception is highly influenced by one’s beliefs and these beliefs in many ways influence the way in which events are understood and acted on. Bandura (1987) argued that “people’s level of motivation, affective states, and actions are based more on what they believe than on what is objectively true” (p. 2). In the context of educational research, teachers’ beliefs are described as thoughts that have a filtering effect on all aspects of the teachers’ thoughts, judgments, and decisions (Clark & Peterson, 1986; Munby, 1982; Nesport, 1987; Pajares, 1992; and Pintrich, 1990). Johnson (1994) described teachers’ beliefs as a substructure that does not operate in isolation but that is connected to all other
beliefs that exist in the individual context. Pajares (1992) characterized beliefs as being formed early in life through a process called cultural transmission and helps people construct an understanding of themselves and the world. According to Pajares (1992), our belief systems influence our thinking and information processing and play an important role in shaping our perceptions and behaviors. Concepts such as attitudes, preconceptions, theories, and values are all beliefs in disguise (Pajares, 1992). Rokeach (1968) also defined beliefs as “heuristic propositions” and wrote that some beliefs are more central than others and that these central beliefs are the most difficult to change. Green (1971) took a philosophical approach and described how humans could hold incompatible or inconsistent beliefs and that humans hold beliefs in clusters. Each cluster of beliefs may be protected from other clusters and there is very little cross-fertilization between the clusters of beliefs, which allows these incompatible and inconsistent beliefs from co-existing and “as long as incompatible beliefs are never set side by side and examined for consistency, the incompatibility may remain” (Richardson, 1996, p. 103).

Preservice teachers enter teacher education programs with unique, well-formed beliefs shaped by years of classroom observations and they may be resistant to change (Buchmann, 1987; Florio-Ruane & Lensmire, 1990; Johnson, 1994; Lortie, 1975; Wilson, 1990). For new teachers of ELs, their beliefs may be shaped by images of their own formal language learning experience (Richardson, 1996; Borg, 2015; Hall, 2017; Johnson, 1994). Britzman (1986) states that:

The dominant paradigm of teacher education programs was organized on this implicit theory of immediate integration: the university provides the theories,
methods, and skills; schools provide the classroom, curriculum, and students; and the student teacher provides the individual effort; all of which combine to produce the finished product of professional teacher (Britzman, 1986).

This program design is reminiscent of its nineteenth-century origins when teacher education was largely designed as vocational training (Gordon, 1985) using a behavioristic view of learning where “learning is achieved through imitation of working teachers and repeated practice” (Britzman, 1986, p. 443). Through this training, the dominant cultural view of the teacher was as a rugged individualist (Biesta & Lawy, 2006; Richardson, 1990; Waller, 1961) meaning that teaching and the role of a teacher was viewed as an individual endeavor having all the authority and control rather than a social process between time, place, people, and ideas. This individualistic approach to teacher education programs ignored the social and political context of teacher education and did not address the importance of biography during the process of making a teacher (Biesta & Lawy, 2006; Britzman, 1986; Richardson, 1990). Therefore, “critical consideration must be given to what happens when the student teacher’s biography, or cumulative social experience, becomes part of the implicit context of teacher education” (Britzman, 1986, p. 443).

During the past 15 years the literature on teacher education has made significant strides in studying the complex relationship between what teachers think and how their thinking is translated to sound pedagogical practices in teacher education programs (Aston, 1990; Biesta & Lawy, 2006; Borg, 2015; Clark & Peterson, 1986; Fang, 1999; Farrell & Ives, 2014; Hall, 2017; Nespor, 1987; Pajares, 1992; Richardson, 1996; Stuart & Thurlow, 2000). This is a shift from past practice of
researchers focusing their attention on teacher observable behaviors and linking these behaviors to student achievement to evaluate teacher impact (Fang, 1996). New research now looks at teachers’ thinking, beliefs, planning, and decision-making process to evaluate their impact while correlating these cognitive processes to actual delivery of instructional practice (Biesta & Lawy, 2006; Borg, 2015; Farrell & Ives, 2014; Fives & Buehl, 2012; Fives & Gill, 2015; Hall, 2017; Stuart & Thurlow, 2000). Understanding what teachers think in the process of teaching and learning is critical to understanding how they deliver their craft. In the field of second language teacher education, the bulk of traditional research focused on effective teaching behaviors for teaching a second language, positive learning outcomes or products, and teacher-student interactions that promote effective second language learning (Chaudron, 1988). Research in second language teacher education programs focus on understanding the cognitive elements of teaching a second language but the field started to recognize the importance of how second language teachers’ thoughts, judgments, and decisions influence their instruction of the second language (Borg, 2011; Borg, 2015; Freeman, 1989; Johnson, 1992a, 1992b; Richards & Nunan, 1990).

**Impact of Teachers’ Beliefs on Classroom Practice**

If teachers bring personal beliefs and practical theories into the classroom, the question becomes how these beliefs and theories get implemented or carried out in the classroom. There is clear evidence that there is a relationship between teacher beliefs and teaching practice and that these beliefs play a pivotal role in how teachers learn to teach, how they gather and interpret information, and in what teachers say and do (Borg, 2011; Brickhouse, 1990; Clandinin, 1986; Clark & Peterson, 1985; Cochran-
Beliefs drive actions, however, teachers’ experiences and reflection on practice (action) may lead to changes in beliefs (Borg, 2011; Chittenden & Amarel, 1976; Johnson, 1994; Richardson, 1996; Schubert, 1991).

The reality is that there are consistent practices in the field of education where personal beliefs and both personal and formal theories are disconnected from classroom practice (Duffy & Anderson, 1984; Heritage, Walqui, & Linquanti, 2015; Kinzer, 1988; Nihat, 2010; Readence, Konopak & Wilson, 1991). For example, in a study conducted by prospective language teachers observing veteran language teachers as part of their practicum experience, 90% (n=28) of the participants stated that the curricular and pedagogical requirements they learned through their teacher education program was much richer than what they actually observed in the classroom (Nihat, 2010). The study aimed to highlight the possible dilemmas in teaching English to children as a second language and one of the key findings was that actual practices did not adequately meet the curricular and theoretical requirements of the study.

Researchers observed a theory to practice dichotomy in this study. Nihat’s qualitative study yielded a number of observation notes that allude to this disconnect such as: “what we have learned at university does not have the slightest match with what is going on actually; the practices I observed seriously breach the specified goals and contemporary constructivist teaching approaches, and still repeat the traditional
grammar-based goals and instructional practices; it is very oblivious that children do not know why they learn English they seem they just have to” (Nihat, 2010, p. 36-37).

Some journal entries in this same study showed an agreement that classical grammar-translation method and audio-lingual methods dominated what they observed in the field such as:

Surprisingly nothing is communicative; I don’t think teachers have the slightest idea about the acquisition of a foreign language in the communicative way; I usually find the teacher try to explain something, sometimes using her mimes and gestures, but it is done rather in Turkish than in English, which means students are not exposed to any communicative comprehensible input.  

(Nihat, 2010, p. 36-37)

This study brought to light some dilemmas in teaching English to children such as the over dominance of grammar focused lessons rather than communicative focused lessons, failure to appeal to students emotionally so they enjoy learning the second language, insecure classroom environment not conducive for risk taking, lack of or improper use of game activities, lack of group or pair work, failure to consider individual differences in the learner as an agent, lack or inappropriate integration of language skills, inadequate feedback, and inadequate evaluation practices (Nihat, 2010).

The research and findings by Nihat (2010) align with similar findings from Heritage, Walqui, and Linquanti (2015) that recommended a series of pedagogical shifts outlined in Chapter One that need to be made in order to meet the increased demands placed on ELs. However, Heritage, Walqui, and Linquanti (2015) also note
that in order to make these recommended shifts, language teachers “first need to gain awareness of their current theoretical stances and any inherent limitations therein and only then will they be in a position to transform their existing theoretical perspectives and the teaching practices on which they are based” (p. 53). For example, Heritage, Walqui, and Linquanti (2015) observed teachers of ELs using strategies where traditional grammar was taught based on grammar-translation theories, strategies that focused on structural features of language, and audio-lingual methods that focused on teaching language acquisition as an individual process rather than a social process. Therefore, Heritage, Walqui, and Linquanti (2015) found that in observing teachers of ELs, teaching practices emerged from very different theories and there was not coherence in the delivery and approach to educating ELs. Heritage, Walqui, and Linquanti (2015) state:

Pedagogical coherence merits greater attention in the field of teaching ELLs. Teachers who use strategies learned here and there, which may come from different and incommensurable paradigms, work at cross purposes that lessen the possibility of achieving the desired outcomes for students. With the pedagogical coherence that comes from an integrated theory of teaching and learning, teachers can provide quality learning for ELLs that will help them to meet the new standards. (p. 85)

Complexities of the Classroom and Impact on Classroom Practice

The reality is that there are many constraints placed on teachers that make it difficult for them to dedicate the time to explore the theories that influence their beliefs, which ultimately impact classroom practice (Beattie, 1995; Brophy and Good,
Duffy and Anderson (1984) continue to state, “the issue is not whether teachers should possess theoretical knowledge. They should. Instead, the issue is how teachers can apply theoretical knowledge in real classrooms where the relationship between theory and practice is complex and where numerous constraints and pressures influence teacher thinking” (p. 103). Given that teachers’ thoughts and beliefs are not observable but teacher behaviors are, this places the responsibility of student behavior and student achievement solely on the teacher (Clark & Peterson, 1986; Fang, 1996). Therefore, the responsibility of the teacher is not only in their thoughts and behaviors but also on how students behave and how students learn (Klem & Connell, 2004; Milanowski, 2004; Skinner & Belmont, 1993; Stronge, Ward & Grant, 2011; Stronge, Ward & Tucker, 2007).

This connection between teacher behavior and student achievement came out of traditional research such as process-product research that was concerned primarily with the relationship between teachers’ classroom behavior, student’s classroom behavior, and then ultimately student achievement as a way to measure student achievement by looking at teacher behavior (Fang, 1996). Process-product research was conducted under contrived conditions and data collected used observation scales that were categorized into themes and its major goals was to determine excellence criteria for teaching by estimating the effects of teachers’ performances on student learning (Beattie, 1995). There was an assumption that studies using this method of research yielded unidirectional causality between the teachers’ classroom behavior which affected student classroom behavior which ultimately affected student
achievement (Doyle, 1977; Dunkin and Biddle, 1974). Further this research assumed that causality was unidirectional (Fang, 1996). New research represents causality as not linear but cyclical or circular suggesting that teacher behavior affects student behavior which affects teacher behavior and then ultimately student achievement (Brophy and Good, 1986).

Aside from teacher behaviors being linked to student achievement, there are other stressors that influence teachers’ ability to translate theory to practice. Davis and her associates (1993) conducted a study, which indicated that teachers’ instructional decision-making was influenced by outside factors such as the principal’s and mentoring teacher’s decision making around following district and state and local mandates. These researchers also further suggested that the cause of this dichotomy between theory and practice might stem from psychological, social and environmental realities of the participants’ schools that either created opportunities for this transfer to happen or constrained teachers’ practice (ChanLin, Hong, & Horng, 2006; Davis, 1993; Kennedy & Kennedy, 1996; Mansour, 2009; Nisbet & Warren, 2000). Sapon-Shevin (1990) found that district evaluation and grouping policies have an effect on teachers’ self-perceptions, expectations for students and ultimately, their individual classroom practices.

**Teacher Innovation**

Applying theory to classroom practice is a difficult task, which can be attributed to the fact that changing teachers’ beliefs and therefore classroom practice is complex. According to Bailey (1992), many articles about teacher development rarely mention change but few address teacher change as a central topic. Teacher change
should be central to teacher development (Ball & Boerst, 2009; Bartlett, 1990; Borko, 2004; Brindley & Hood, 1990; Freeman, 1989; Gebhard, 1990; Guskey, 2002; Larsen-Freeman, 1987; Opfer, Pedder, & Lavicza, 2011; Pennington, 1990). Bailey (1992) distinguishes the terms change and innovation. Change involves the reordering of existing patterns that can be planned or unplanned, negative or positive, whereas innovation is perceived as a new idea or practice intended to improve practice and is carefully planned and deliberate in implementation (Bailey, 1992; Nicholls, 1983).

There are several reasons teacher innovation is hard for teachers as there are many factors that influence teachers’ beliefs and therefore, classroom practice. One factor that impacts teachers’ beliefs is that learning is an active and constructive process influenced heavily by existing beliefs and preconceptions that play a strong role in what and how students learn (Resnick, 1989). In other words, there is a strong correlation between personal experiences and how one approaches teaching through the lens of these experiences (Brookhart & Freeman, 1992; Bullough & Knowles, 1991; Clandinin, 1986; Clandinin & Connelly, 1991; Fickel, 2000; Kelchtermans, 2009; Resnick, 1989; Schutz & Zembylas, 2009). Another factor influencing teachers’ beliefs is that teacher experiences with schooling and instruction influences their perceptions of their roles as teachers (Anning, 1988; Britzman, 1991; Brousseau, Book, & Byers, 1988; Feiman-Nemser, 1983; Knowles, 1992; Lortie, 1975; Richardson, 1996). Another factor influencing teachers’ beliefs is teachers’ experience with formal knowledge, which is defined as knowledge agreed upon by a community of scholars as worthwhile and valid (John, 1991; Leinhardt, 1988; Richardson, 1996). This formal knowledge is shaped through schooling since
kindergarten (or preschool) and consists of knowledge acquired through school subjects, outside readings, television, and other experiences provided to students (Leinhardt, 1988; John, 1991). Additionally, formal knowledge of how students acquire a second language differ for preservice teachers when paired with experienced teachers and that beliefs of preservice teachers and their practice did not change over time even after receiving training from experienced teachers (Peacock, 2001).

Therefore, Peacock (2001) makes three key recommendations as a result of the study:

First, I suggest that if trainees have any beliefs about language learning that may negatively affect their future students’ learning, it is important for programme instructors to consider changing them. Second, teachers should try to amend the beliefs at the start of the programme. Third, work on beliefs should be an integral part of TESL core courses. (p. 189)

In order for theory to impact preservice teachers, theory needs to be perceived as useful to these teachers in their individual contexts (Lewis, 1945; Richardson, 1990; Tilson, Sandretto, & Pratt, 2017). Also, if beliefs or personal theories are unattended and not critiqued, teachers will continue to be resistant to change (Fives & Buehl, 2012). In order for teachers to make a paradigm shift and transform their teaching, they must first understand how their beliefs influence their practice (Fives & Buehl, 2012; Heritage, Walqui, & Linquanti, 2015; Nespor, 1987; Zheng, 2013) and teachers must visualize what they can shift to (Nespor, 1987). Teachers need great models to learn from in order to make the shift happen. Making shifts is not an easy endeavor and often requires teachers to take risks (Johnson, 1994). Teachers need adequate training in the “procedural knowledge of classrooms, adequate knowledge of pupils or
the extended practice needed to acquire that knowledge, or a realistic view of teaching in its full classroom/school context” (Kagan, 1992, p. 162).

Teachers serve five distinct roles/functions as language teachers: teacher as communicator, teacher as educator, teacher as evaluator, teacher as an educated human being, and teacher as an agent of socialization (Lavadenz, 2011; Wong-Fillmore & Snow, 2000). Teachers of language must possess the knowledge of language and pedagogical practices and take a proactive stance toward understanding the diverse learners that populate language classrooms, particularly second language classrooms (Lavadenz, 2011).

**Summary**

The dominant paradigm of SLA is heavily influenced by cognitivism but new and contemporary theories and approaches are starting to emerge moving away from a single approach to SLA. SLA theories and approaches are varied, which may make the field seem unfocused and confusing. However, the academic achievement of ELs are still lower than their peers, there are many ELs classified as LTELs, and there is a high over representation of ELs in special education programs. Therefore, a new paradigm shift may be needed to change the trajectory of ELs. Pedagogical shifts suggested by Heritage, Walqui, and Linquanti (2015) include ten recommendations. This study examined three of these shifts such as viewing language acquisition as a social process, viewing language acquisition as non-linear and complex, and lastly, shifting from preteaching content to scaffolding student learning.

Using ANM to examine the literature about acquiring language (NsLLT), the Heritage, Walqui, and Linquanti (2015) recommendations are supported. But, whether
or not the educators’ beliefs about these shifts when given professional development on theory and practice of these shifts may affect implementation of changes. Chapter Three addresses the methods and procedures used to answer the following research questions formulated for this study:

1. *Does the literature within the ANM framework support and/or add to the recommended Heritage, Walqui, and Linquanti (2015) pedagogical shifts?*

2. *Do the beliefs of district educators who serve ELs align more to the literature around language acquisition or language development as measured by a survey?*

3. *How did the beliefs of educators that received neuroeducation professional development differ from those that did not receive professional development as measured by a survey?*

4. *How did the beliefs of educators who received neuroeducation PD on the methods of language acquisition align with their beliefs about effective instructional methods and their instructional practice when observed a year after the PD as measured by a survey and an observation tool?*

5. *How did these educators show the same or different sets of beliefs about effective instructional methods aligned to their practice when compared to a group of educators who have not received the same professional development as measured by a survey and an observation tool?*
Chapter Three

Methods and Procedures

This chapter describes the research methods and procedures for data collection, sampling, and analysis for the research questions and purpose of the study. The purpose of this qualitative study was twofold: 1) To determine if the Arwood Neuroeducation Model (ANM) supports the pedagogical shifts recommended by Heritage, Walqui, and Linquanti (2015); and 2) If those district educators with and without a professional background in both the pedagogical shifts and in educating ELs based on the ANM show beliefs about language development and/or language acquisition that are aligned with their classroom practices.

This chapter is organized into two sections: The first section discusses the methods for using an existing neuroeducation model as a theoretical framework that considers the literature about language, not just from a cognitive psychology perspective, but also from a neuroscience as well as language function perspective, ANM. The second section describes the application of ANM to examine the educational beliefs and practices of educators within a school district. The researcher was interested to know if the PD around ANM as applied to language acquisition, shifted the thinking of educators enough to change their practices to be parallel.
Analysis of Arwood’s Neuroeducation Model and the Pedagogical Shifts

In order to determine if the ANM supports the pedagogical shifts recommended by Heritage, Walqui, and Linquanti (2015), the researcher created a table with the three selected shifts to examine whether these shifts aligned to the tenets of ANM. The researcher tied each of the shifts to the literature regarding language acquisition through the neuroeducation lens. The purpose of this section was to identify the key concepts of ANM that could be used as alternate views to the pedagogical shifts in order to substantiate the recommendations using the overlapping of cognitivism, language function, and neuroscience. This Alignment of ANM and Shifts Proposed by Heritage, Walqui, and Linquanti (2015) can be found in Table 4.1 in Chapter Four.

The alignment of the tenets of ANM and the recommended shifts may be used to impact classroom practice for ELs. However, in order to determine if ANM can be applied to SLA classrooms, the researcher added another layer to this part of the investigation. The researcher used the ANM with the overlapping cognitive psychology, neuroscience, and language diagram and inserted the SLA theories and approaches that underlie the pedagogical shifts and showed how the theories and approaches fit within the ANM model. This diagram may be found in Figure 4.1 in Chapter Four.

Then, the researcher used key concepts supporting the first pedagogical shift, which is seeing language acquisition as a social process rather than an individual process and placed these key concepts into the same ANM model. The addition of these concepts filled in the language function circle of ANM model, which can be
viewed in Figure 4.2. The researcher repeated this analysis for the next two pedagogical shifts and created Figure 4.3 and Figure 4.4 to show how additional tenets of ANM are needed to complete the diagram for the field of SLA in order to show alignment between ANM and the shifts.

**Analysis of Educators’ Beliefs and Classroom Practice**

The second part of the study was designed to apply ANM to 1) determine whether the beliefs of those who teach ELs aligned more with the development of language (pre-shift) or the acquisition of language (post-shift); and 2) to determine if professional development on the elements of the shift aligned with the Arwood Neuroeducation Model impacted educators’ classroom practice. There were four research questions considered in this part of the study.

**Research Questions**

The overarching research question used for this study was: How did educators’ beliefs about how English Learners learn language translate into their classroom practice with, and without, PD about the differences between language acquisition and language development within a neuroeducation framework? The supporting questions are outlined below:

1. Do the beliefs of educators such as teachers, school psychologists, speech language pathologists, self-contained teachers, and administrators in the district align more to the literature around language acquisition or language development?
2. How did the beliefs of educators that received neuroeducation professional development differ from those that did not receive professional development as measured by a survey?

3. How did the beliefs of educators who received neuroeducation PD on the methods of language acquisition align with their beliefs about effective instructional methods and their instructional practice when observed a year after the PD as measured by a survey and an observation tool?

4. How did these educators show the same or different sets of beliefs about effective instructional methods aligned to their practice when compared to a group of educators who have not received the same professional development as measured by a survey and an observation tool?

Setting

The district that was the subject of the study is a diverse district in the state of Oregon with over 100+ different languages spoken by the students and families. The district houses a school population of about 41,000 students. The district is currently a majority minority district with 51% students of color with Hispanic/Latino (a) being the highest student group of color followed by Asian. There are about 13% ELs in the district, 12% students with disabilities, and 37% students qualifying for free and reduced lunch. According to the state’s website, the four-year graduation rate for the district is 83%, which is higher than the state average of 75% and the dropout rate for the district is 2%, lower than the state average of 4% (2016).

There are currently 5,000 ELs in the district with Spanish being the top language spoken by majority of ELs. The second most spoken language is Arabic
followed by Japanese. About 20% of active ELs in the district are classified as also having a disability, which is 2 percentage points higher than the state average of 18% (Oregon Department of Education, 2016). In the 2015-2016 school year, 46% of ELs in the district showed progress in learning English based on the state English Language Proficiency Assessment (ELPA) and 8% of students with 5 or less years in the country attained proficiency. Only 17% of students with more than five years attained proficiency. Currently, there are about 23% of active ELs (1,169) labeled as ELSWD in the district with 3% of them meeting state standards for English Language Arts and 3% of them meeting the math standards. The four-year cohort graduation rate for ELSWD in the district is 50% and the dropout percentage for this subgroup is 14%.

This district has not adopted one specific program for ELs nor has one particular delivery model been adopted. At the elementary level, some schools provide English language services through a pull-out model where a group of ELs are pulled out of the mainstream classes to learn language. Some ELs receive services through a collaborative co-teaching model where the English Language Development (ELD) Specialists push into the mainstream classroom and co-teach, co-plan, and co-assess with the mainstream teacher to deliver language embedded content to students. Secondary students either receive English instruction through a co-teaching model or through a separate English class period where students are grouped according to language proficiency and an ELD Specialist is responsible for delivering language instruction. These services across schools continue until ELs reach the required level of proficiency by the state. Another model some ELs have access to is the dual
language program approach where students learn literacy skills in their native language while learning their second language. The goal of this program is for ELs to be proficient in both English and the target language, which in this district is Spanish. The instructional strategies and approach to teaching ELs used in the district vary depending on the program model(s) outlined above.

Methods

A qualitative approach was used for this study. Qualitative methods are designed to “understand how people interpret their experiences, how they construct their worlds, and what meaning they attribute to their experiences” (Merriam, 1998, p.5). The qualitative approach focuses on people’s actual experiences and from their perspectives (Roberts, 2010). Qualitative researchers go into the field to collect the data, seek a holistic picture, make observations, conduct in-depth and open-ended interviews, capture feelings, all often in natural, real-world settings (Roberts, 2010). The research questions called for an in-depth analysis of the factors associated with EL educators’ beliefs about how ELs acquire language, whether or not neuroeducation PD made a difference in their beliefs and whether those beliefs aligned with their practices.

To conduct this qualitative study, the first thing the researcher did was to identify which groups of educators to target to take the survey. Second, the researcher developed the questions for the survey. Third, the qualitative data were collected through a survey of nine questions with the first five and classroom observation and grouped into categories. The survey was selected to investigate whether the beliefs of educators aligned to the literature on language acquisition or language development.
Fourth, the frequency of the comments under each category was tabulated to create number data to determine the relationship between the categories.

**Selection of Participants**

As part of the district’s Internal Review Board (IRB) process, the researcher received permission to conduct the study by submitting a description of the study and the methods. Then, participants were selected based on their role and involvement with ELs. Figure 3.1 provides a visual of the participant sampling for this study.

![Figure 3.1. Participant Sampling Visual](image)

There were three groups of educators that were selected to take part in the study. The first group was a general group of educators, specifically 500 educators from various backgrounds (192 ELD teachers, 82 special education specialists, 32 administrators, 28 school psychologists, 24 speech language pathologists, and 142 content area teachers). These educators were selected based on their title. For
example, speech language pathologists were selected because they used certain
techniques that helped students with communication disorders; and, so their
understanding of acquisition or development was critical for their practice. The
others were identified based on their title such as ELD teacher, school psychologist,
and English Language Arts teacher. The tool used for this group of 500 participants
was a survey. How the survey was developed will be covered later in the chapter.

Within the 500 participants mentioned previously, there were 292 educators
who received PD on neuroeducation of language acquisition versus language
development. Then, of the 292 educators that received PD, four of the educators were
selected for the study. This group of four educators that received PD consisted of all
ELD teachers and they were selected based on whether they attended both PD
opportunities. There were more ELD teachers that attended both PD opportunities but
these four were selected based on level (elementary, middle, and high). These
teachers were selected based on convenience sampling as these teachers worked in the
same district that is the subject of this study. Two of the teachers had 11-20 years of
experience and two had 21+ years of experience and teach at varying levels, 2 middle
level, 1 elementary level, and 1 high school level. They were not selected based on
the number of years of experience. These teachers received the survey and were
observed in the classroom.

The third group of educators was a group that did not receive PD on
neuroeducation or on the pedagogical shifts. Again, they were selected based on
convenience sampling as the researcher worked in the same district as the teachers.
They were asked to participate via email and they all agreed to participate in the study.
This group was also ELD teachers and two had 0-5 years of experience and two had 6-10 years of experience. Again, they were not selected based on the number of years of experience. One was from the elementary level and 3 from the high school level. This group also received the survey and they were observed once in the classroom. It is important to note that the general group surveys did not include the group with PD and the group with no PD as these two groups were given a different survey.

**Professional Development**

Given the participants were selected based on their background of whether they received neuroeducation PD or not, it is important to know what was provided in the PD and the connection of the PD to this study. There are three research questions (#2, 3, 4 as outlined in Chapter One) that involve PD, which provides a rationale for looking at the PD that educators received in the district. The research questions call for an alignment of beliefs to the literature on language acquisition or language development. Some educators in the district received extensive training on the differences between acquisition and development and so this study and the research questions developed analyzed their beliefs on language acquisition and how their beliefs translated to classroom practice. Some educators also received PD on ANM including the theory linking all three lenses of the Model, the NsLLT.

Table 3.1 provides a timeline for when the PD to teachers was delivered. It started in the summer of 2016 with a small group of teacher leaders and administrators in the Multilingual Department and Dr. Robb presented. Dr. Robb is a graduate of UP and recognized for her work with ELs. She has over 10 years of data on ELs using Arwood’s Neuroeducation Model showing 100% passing rate for reading, writing, and
math for first graders during the last seven years. This training was mandatory for the leadership team.

Then, in the fall of 2016, the same presentation was delivered to 200 ELD teachers in the district; and, Dr. Arwood delivered the same presentation. The topic was an introduction to neuroeducation and to the NsLLT as these related to ELs. This training was mandatory for the ELD teachers as part of their beginning of the year PD.

In the spring of 2017, a follow-up PD was delivered to a smaller group of ELD teachers and the content was application of the Neuroeducation Model to classroom practice. This was delivered by both Dr. Arwood and Dr. Robb and was optional for teachers wishing to enhance their instructional practice using strategies that align to Arwood’s Neuroeducation Model.

Table 3.1

Timeline of Professional Development

<table>
<thead>
<tr>
<th>Summer 2016</th>
<th>Fall 2016</th>
<th>Spring 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to Neuroeducation and NsLLT</td>
<td>Introduction to Neuroeducation and NsLLT</td>
<td>Follow-up PD, Application of Neuroeducation/NsLLT</td>
</tr>
<tr>
<td>Presenter: Dr. Robb (Robb &amp; Arwood, 2010)</td>
<td>Presenter: Dr. Arwood</td>
<td>Presenters: Dr. Arwood, Dr. Robb</td>
</tr>
<tr>
<td>Audience: Leadership Team of Admin and TOSAs</td>
<td>Audience: 200 ELD Teachers in the district and elementary principals (separate dates)</td>
<td>Audience: 30 ELD Teachers</td>
</tr>
<tr>
<td>Mandatory, 6 hours</td>
<td>Mandatory, 3.5 hours</td>
<td>Optional, 6 hours</td>
</tr>
</tbody>
</table>
There were overlaps of staff members attending all three training opportunities and one of the participants for the group that received PD attended all three PD sessions. The next section will describe the instruments designed for the different phases of the second part of the study.

**Instruments**

As mentioned previously, there were two instruments used for this study: a survey and an observation tool. A survey was used as part of the qualitative approach to gather thoughts and beliefs of key educators in the school district that have experience working with ELs and ELs with a language-learning disability. The research questions developed to gather thoughts and beliefs of key educators are: 1) What is your understanding of how language is acquired, and 2) What is your understanding of how students acquire a second language. What difference is there, if any, between first and second language acquisition? These questions were selected to gain a better understanding on whether educators made the pedagogical shifts recommended by Heritage, Walqui, and Linquanti (2015) in seeing language acquisition as an individual or social process and/or if they understood that language acquisition was not a linear process but a complex one.

Surveys have remained a useful and efficient tool for learning about people’s opinions and behaviors and are effective for predicting outcomes using a smaller sample size (Dillman, Smyth, and Christian, 2009). Surveys can be used to conduct a needs assessment or an asset assessment to determine respondents’ perceptions of an area that needs an intervention (Brun, 2014). The survey method was chosen to reach
a larger sample of participants, to collect locally specific information, and to obtain the results in a more efficient manner.

Qualtrics was used to design and administer the survey to participants. Qualtrics was equipped with a data analysis component where tables and graphs could be generated as surveys were completed. The full survey can be found in Appendix B. Figure 3.2 provides a visual of the survey questions. The first five questions were demographic questions to gain a better understanding of who was taking the survey. Only questions 6, 7, and 9 were coded and analyzed to see if there was alignment of beliefs to language development and/or language acquisition. Question 8 on neurotypical and neuro-atypical ELs was eliminated after the survey was sent out because there was not a need to analyze the beliefs of educators on neurotypical and neuro-atypical ELs as the study focused on their beliefs on language acquisition and not on whether ELs were neurotypical or neuro-atypical. The researcher made this adjustment after the survey was sent to participants.

**Figure 3.2. Participant Survey Questions**

<table>
<thead>
<tr>
<th>Demographic Questions</th>
<th>Only questions #6, 7, &amp; 9 were analyzed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What is your role in the district?</td>
<td></td>
</tr>
<tr>
<td>2. What grade level(s) do you teach/serve?</td>
<td></td>
</tr>
<tr>
<td>3. How many years of experience do you have in education?</td>
<td></td>
</tr>
<tr>
<td>4. What endorsements do you currently hold?</td>
<td></td>
</tr>
<tr>
<td>5. What is your experience working with English Learners (ELs)?</td>
<td></td>
</tr>
<tr>
<td>6. What is your understanding of how language is acquired?</td>
<td></td>
</tr>
<tr>
<td>7. What is your understanding of how students acquire a second language?</td>
<td></td>
</tr>
<tr>
<td>8. What are some characteristics of neurotypical and neuro-atypical ELs? (neurotypical ELs are those whose development follows predicted outcomes and neuro-atypical ELs are those whose development does not follow predicted outcomes)</td>
<td></td>
</tr>
<tr>
<td>9. What are key instructional methods that should be used to teach English and how effective are these methods at helping ELs reach proficiency in English?</td>
<td></td>
</tr>
</tbody>
</table>
The purpose of the survey was to capture the thoughts, opinions, beliefs, and actions of these educators that worked closely with ELs in order to see what their beliefs were after the PD and whether these beliefs aligned to the literature around language acquisition and language development. The survey was sent to all participants (teachers, school psychologists, speech language pathologists, self-contained teachers, and administrators via email (see Appendix A). The email and survey included a summary of the rationale of the study, information on confidentiality, how the results would be used, and a clause on how important it was to answer all questions. Participants were notified the survey was optional. Participants were given a month to complete the survey. This information was included in the email that was sent to all participants and they were given a due date of when to submit the survey. To avoid coercion, only two follow up emails with the survey link were sent to selected participants. A copy of the reminder emails sent to participants can be found in Appendix D.

Before sending the survey to participants, the researcher sent a sample survey to the doctoral students in the same cohort as the researcher to obtain feedback on the questions and the overall design of the survey. This group consisted of 16 members from varying backgrounds and expertise but with a common goal of completing a dissertation. After receiving feedback from this expert group on the methods of the survey and not the content, the researcher incorporated the feedback and subsequently refined the questions so the survey was clear and easy to understand. The changes are outlined below:
1. The original survey asked participants about their thoughts and beliefs on how language was acquired. However, some members of the expert group felt this was too broad and suggested the questions asked about the participants’ understanding of how language was acquired.

2. The survey was also shortened and questions were better aligned with the research questions. The expert group felt the questions were too long and confusing.

3. The background information included at the introduction of the survey was also significantly reduced as this expert group felt it was too long of an introduction and that the participants taking the survey would skip over the whole background and miss the essence and purpose of the survey.

4. After final review of the survey and after changes were made, participants were sent an email with the survey link provided by Qualtrics. Emails were provided through the district server.

The second instrument used within this study was a classroom observation tool. The district Internal Review Board (IRB) did not allow the researcher to conduct the classroom observations, as the observations may appear evaluative given the position the researcher holds in the district. Therefore, the researcher hired an outside observer to conduct the classroom observations. The outside observer, Alyse Rostamizadeh was an educator with background and training on ANM and the NsLLT. The researcher contacted a local clinic (APRICOT, Inc) that used the NsLLT
to see if someone could be the observer. Rostamizadeh was recommended.

Rostamizadeh is currently on parenting leave and not employed in any district. It was believed that the fact that the observer was not employed by any district also helped remove any bias the observer might have had about the methods and beliefs adopted within a district. Rostamizadeh will be referred to as “the observer” in this study.

After identifying the observer, the researcher asked the teachers through email to provide their teaching schedule. Then, the researcher created an observation schedule to ensure the observer was able to visit each classroom. The researcher sent the observer the observation schedule including the addresses of the schools, time, and location of the classrooms. The researcher also sent the schedule to the school administrators so they were aware there would be a visitor in the building. The researcher was not present during these classroom observations.

The purpose of qualitative recording of observations was to provide rich, contextual descriptions (Brun, 2014). Direct observations allow for the researcher to be directly involved in the activity observed (Yin, 2009). These observations allowed for data to be collected in its natural environment and this technique allowed the researcher to gain insight into how language acquisition was being taught in classrooms. Although this technique had many advantages, the researcher needed to ensure personal bias was not part of the data gathering and analysis process. This method, qualitative recording of observations, was chosen to document the actual methods used to help ELs acquire language.

The observer hired for the study used a classroom observation tool to take notes on common themes around language acquisition and instructional strategies used
in the classroom to help students acquire language. The observation tool was designed as part of the PD that the consultants (Dr. Arwood and Dr. Robb) used for follow up in classrooms after the presentations. The questions align to the constructs of the NsLLT and to the acquisition, not development, component of language. Before using the tool with teachers, the researcher demonstrated the construct validity of the tool by aligning the questions to the literature supporting the NsLLT. The construct validity of the tool will be discussed later in the chapter.

**Phase One Procedures and Data Analysis**

To determine whether the beliefs of the general group of educators aligned to the literature on language acquisition or language development, the researcher took the higher frequency numbers of development or acquisition to make this determination. Table 3.2 highlights the survey questions aligned to the first research question for this part of the study.

Table 3.2

*Phase One Research Question Aligned to Survey Questions*

<table>
<thead>
<tr>
<th>Research Question #1</th>
<th>Survey Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do the general beliefs of educators in the district that is the subject of this study align more to the literature around language acquisition or language development as measured by a survey?</td>
<td>6. What is your understanding of how language is acquired?</td>
</tr>
<tr>
<td></td>
<td>7. What is your understanding of how students acquire a second language? What difference is there, if any, between first and second language acquisition?</td>
</tr>
<tr>
<td></td>
<td>9. What are key instructional methods that should be used to teach English to ELs and how effective are these methods at helping ELs reach proficiency in English?</td>
</tr>
</tbody>
</table>
Phase one was designed to answer the first research question: *Do the general beliefs of educators in the district align more to the literature around language acquisition or language development?* To answer this question, the general group of participants (500) was sent a survey that was described in the previous section via email. They were given a month to answer the survey and received two reminder emails in order to improve the response rate and also to avoid coercion. The survey asked participants about their beliefs on how ELs acquired language to include a second language as well as their understanding of the best instructional methods for teaching English to ELs. These three questions along with the demographic questions on the survey were collected and analyzed.

To analyze the data on the survey, the first step of the data analysis process involved downloading survey responses into one spreadsheet from the Qualtrics database. This was done for all phases of the study, as there were three different groups that took the same survey. Then, the reports were extracted and opened in Excel. Using Excel, the EZAnalyze tool was added to Excel to help facilitate the coding process particularly around the coding of the demographic information.

The second step was to begin to code the qualitative data from the survey responses. There were two cycles of coding the data used in this study, first and second cycle coding methods. Within the first cycle of coding, there were two methods used. The first method was descriptive coding, also known as topic coding, which identifies and links comparable content. Descriptive coding connects a basic topic of a passage of qualitative data and links either a word or phrase often in the form of a noun to this topic and this type of coding is appropriate for almost every
qualitative study (Saldaña, 2016). According to Tesch (1990), descriptive coding should generate codes that are identifications of the topic rather than merely abbreviations of the content extracted from the qualitative study. Tesch (1990) continues to state, “the topic is what is talked or written about. The content is the substance of the message” (p. 119). Wolcott (1994) states, “description is the foundation for qualitative inquiry, and its primary goal is to assist the reader to see what you saw and to hear what you heard in general” (pp. 55, 412) “rather than scrutinize the nuances of people in social action” (Saldaña, 2016, p. 102).

The next first cycle method used was in vivo coding also known as literal coding, verbatim coding, inductive coding, indigenous coding, natural coding, and emic coding (Saldaña, 2016). In vivo technically means “in that which is alive” (Saldaña, 2016, p. 105). As a code, it refers to a word or a phrase taken from the actual responses from participants found in the qualitative data and these words or phrases can be used as the descriptive label (Saldaña, 2016; Strauss, 1987). Strauss (1987) calls the in vivo codes “the terms used by participants themselves” (p. 33). The survey was distributed to a large group of educators with varying cultural and linguistic backgrounds so it was important to the researcher to use in vivo coding to capture any unique references to culture, subculture, or microculture.

After downloading the responses from the survey for all three groups the first cycle coding process of descriptive coding and in vivo coding methods involved reading each phrase, sentence, and paragraph from the survey and assigning a descriptive code or an in vivo code to that phrase, sentence, and paragraph. In this study, the researcher read through all of the survey responses from all three groups
aligned to each of the survey questions. The researcher developed a master-coding list (see Appendix F) after downloading all responses from the survey for all three groups. Within each survey question, descriptive and in vivo codes were counted for frequency. This allowed the researcher to track when second or third references were made for each of the codes. The researcher reviewed the master-coding list and grouped like codes and then added the frequency counts. Finally, the researcher completed the first cycle coding process by counting the number of codes generated for each survey question and identified the top codes for each question. Frequency of codes were counted for further analysis. This same first cycle process was done for the surveys completed by all three groups, the general group, by the participants that received PD and by the participants that did not receive PD. The frequency of first cycle codes were not generated for the eight select participants as their survey responses did not generate a variety of different codes due to the small sample size.

After completing the first cycle coding methods outlined above, the second coding method involved pattern coding which grouped summaries into smaller categories, themes, or concepts (Miles, Huberman, & Saldaña, 2014, p. 86) and recoded with different codes. Pattern coding pulls together a lot of material from the first cycle coding and sorts the material into more meaningful categories or meta codes (Miles et al., 2014, p. 86). Pattern codes are “explanatory or inferential codes, ones that identify an emergent theme, configuration, or explanation” (Saldaña, 2016, p. 236). The process of pattern coding involved taking the first cycle codes for each question and for each separate group and regrouping them into more meaningful categories using the neuroeducation lens. The pattern codes were then categorized
into two distinct categories: language development and language acquisition which helped the researcher analyze whether the beliefs of the general group, the group that received PD and the group that did not receive PD aligned more to the literature on language development or language acquisition. Frequency of pattern codes were also counted and analyzed to determine alignment to the literature.

**Phase Two Procedures and Data Analysis**

To determine whether the beliefs of the general group aligned to the beliefs of the group with PD and the group without PD, the researcher took the higher frequency numbers of development or acquisition to make this determination and compared the alignment between all three groups. Table 3.3 outlines the survey questions that were aligned to the second research question selected for phase two of the study. The difference between this phase and the first phase is that the first phase only looked at the beliefs of the general group and aligned their beliefs to development or acquisition, whereas this phase aligned the beliefs of the general group, the group with PD, and the group without PD to development or acquisition.
Phase two of the study was designed to answer the second research question:

*How do these general beliefs compare to the beliefs of educators that received PD and those that did not receive PD in the differences between language acquisition and language development as measured by a survey?* To answer this question, all three groups described in the participant selection section above were part of this phase.

There were four select participants that received PD. These four select teachers agreed to take a survey. In order to connect their survey to the tool, they were required to include their names on the survey but included in the survey was a statement that read: “your identity will be protected by using pseudonyms when writing the report.” Then, after downloading the survey, for these four educators that received PD, their surveys were marked over and replaced with PD1, PD2, PD3, and PD4 in order to protect their identity.
There was another group of four educators that did not receive any PD on neuroeducation and the differences between language development and language acquisition. These educators were also asked to take the survey and to write their names on the survey for the same reasons mentioned above for the group with PD. For the four educators that did not receive PD, their surveys were marked over and replaced with NPD1, NPD2, NPD3, NPD4 again to protect their identity.

The surveys for this second phase were separated into two groups: the group that received PD and the group that did not receive PD on the differences between language development and language acquisition. The demographic data for these groups were collected and analyzed. The coding methods used to analyze the survey questions were the same for these two groups as they were for the general group in phase one. The first and second cycle methods were used for these groups as well. After completing the first cycle descriptive and in vivo methods, frequency tables were generated. Then, the second cycle pattern method was used that involved categorizing the comments on the survey questions into two categories: language development and language acquisition. Frequency tables were created and the higher frequency numbers and percentage indicated alignment of the beliefs to either language development or language acquisition based on which category was higher.

**Phase Three Procedures and Data Analysis**

To determine whether the beliefs of educators who received PD on the methods of language acquisition align with their beliefs about effective instructional methods and their instructional practice when observed a year after the PD, the researcher aligned their survey responses for the question on instructional methods to
the frequency results of the classroom observation tool. Table 3.4 highlights the survey question aligned to the *third research question* for this phase of the study.

Table 3.4

*Phase Three Research Question aligned to Survey Question*

<table>
<thead>
<tr>
<th>Research Question #3</th>
<th>Survey Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>How do the beliefs of educators who received professional development on the methods of language acquisition align with their beliefs about effective instructional methods and their instructional practice when observed a year after the PD as measured by a survey and an observation tool?</td>
<td>9. What are key instructional methods that should be used to teach English to ELs and how effective are these methods at helping ELs reach proficiency in English?</td>
</tr>
</tbody>
</table>

The third phase was designed to answer the third research question: *How do the beliefs of educators who received PD on the methods of language acquisition align with their beliefs about effective instructional methods and their instructional practice when observed a year after the PD?* This phase of the study involved the eight select teachers (four with PD and four without PD) and one classroom observation using the observation tool aligned to the neuroeducation and NsLLT lens.

The PD provided to four of the teachers was described in detail in a previous section. There were four teachers that received PD in the Fall of 2016 on the Neuroeducation Model and NsLLT including a follow-up training in the Spring of 2017. One of these four teachers also received the initial leadership training provided by Dr. Robb in the Spring of 2016 before rolling out the PD to the general group of educators. There other four teachers that were new to the district or to ELD did not
receive the same PD and they were included in the study to assess the impact of PD on beliefs and classroom practice.

To analyze the data and to answer this research question, the researcher took the survey responses for the group that received PD and aligned the results of the analysis in phase two of this study to the results of the classroom observation to determine alignment of beliefs to classroom practice.

Participant observations for the group that received PD took place at four different school sites in the district. These observations did not require any preparation aside from obtaining permission from the administrators at the site as well as permission from the educators. The observer used the classroom observation tool In appendix to take notes on common themes around language acquisition and instructional strategies used in the classroom to help students acquire language. The observation tool asked ten key questions that aligned to neuroeducation and the NsLLT as well as pro-social language. The ten questions required a yes or no response from the observer. There were two pages to the observation tool and a section for the observer to include suggestions toward a continual paradigm shift to neuroeducation.

The observer noted the demographics of the classroom, wonderings, questions, and key phrases or quotes from individual students and teachers as the lesson was being delivered on a separate document. The observer sent the observation checklists, observation notes, and tape recordings of the observations to the researcher for analysis. The classroom observations were tape-recorded and the researcher sent the recordings to a transcription service to be transcribed professionally. The researcher
followed up with the observer and conducted an informal interview via email to see what the observer thought in terms of whether or not the educators were using the methods aligned with the Neuroeducation Model.

Although the observer had a predetermined observation tool that aligned to the neuroeducation lens, the observer noted all events and themes that came up through these observations by including specific quotes from teachers by writing the quotes during the lesson and listening back to the recordings to ensure the quotes were accurate. It was important for themes that emerged from the qualitative observation to be taken into consideration during the analysis section of the study.

Prior to the classroom observations, participants were notified of the purpose of the study, significance of the study to the field SLA, particularly with ELs, the measures that would be taken to ensure confidentiality, potential risks, and how results of the study would be used. The observation tool that was used during the observations was sent to these four participants about a week in advance of their scheduled observation, as it was common practice or common courtesy to share evaluation tools with teachers anytime they are observed, especially by an outside observer. The classroom observations were scheduled by asking participants to take a survey via GoogleForm to indicate which day and time was best for the observation so participants had a choice of when the observation took place. Using this information, the researcher organized and chunked the observations into two to three days to allow time for the observer to travel to and from the sites.

During the observations, the observer tape-recorded the class depending on the comfort of the participants. The observer notified the participants that the recording
could be stopped at any time and upon any individual’s request. The observer noted if any requests were made to stop the recording. No requests were made to stop recording. The recordings from these observations were transcribed and used in the analysis of the study.

To analyze the observation tool data, there were a total of ten yes or no questions. The participants were identified as PD1, PD2, PD3, and PD4, and their responses were included under their pseudonym. Therefore, the researcher is unable to identity the participants and their survey responses to protect the identity of the participants. A frequency table was created to determine the frequency of yes and no responses for each of the ten questions.

**Phase Four Procedures and Data Analysis**

To determine whether the group with PD had similar or different sets of beliefs and practice than the group with no PD, the researcher aligned the survey comments for these two groups and the frequency of yes and no comments on the classroom observation tool. Table 3.5 highlights the survey question that aligned to the *fourth research question* for this phase of the study. Table 3.6 provides a summary of the phases.
Table 3.5

*Phase Four Research Question aligned to Survey Question*

<table>
<thead>
<tr>
<th>Research Question #4</th>
<th>Survey Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>How do these educators show the same or different sets of beliefs about effective instructional methods aligned to their practice when compared to a group of educators who have not received the same professional development as measured by a survey and an observation tool?</td>
<td>9. What are key instructional methods that should be used to teach English to ELs and how effective are these methods at helping ELs reach proficiency in English?</td>
</tr>
</tbody>
</table>

The fourth phase was designed to answer the fourth research question: *How do these educators show the same or different sets of beliefs about effective instructional methods aligned to their practice when compared to a group of educators who have not received the same PD as measured by a survey and an observation tool?*

This phase involves the group that did not receive PD as well as the group that received PD. The purpose of phase three above was to analyze the beliefs and classroom practices for the group that received PD and then to analyze the beliefs and classroom practice for the group that did not receive the same PD. The survey responses for the group that did not receive PD were analyzed the same way for the group that received PD above. Then, the classroom observation tool was also analyzed the same way for the group that did not receive PD. Frequency of yes and no responses were tabulated for this group and compared to the group that received PD.
Table 3.6

**Summary of Phases and Qualitative Methods**

<table>
<thead>
<tr>
<th>Phase</th>
<th>Research Question</th>
<th>Participants</th>
<th>Qualitative Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Do the general beliefs of educators in the district that is the subject of this study align more to the literature around language acquisition or language development as measured by a survey?</td>
<td>General Group</td>
<td>Survey Questions #6, 7, 9</td>
</tr>
<tr>
<td>2</td>
<td>How do these general beliefs compare to the beliefs of educators that received professional development and those that did not receive professional development in the differences between language acquisition and language development as measured by a survey?</td>
<td>General Group</td>
<td>Survey Questions #6, 7, 9</td>
</tr>
<tr>
<td>3</td>
<td>How do the beliefs of educators who received professional development on the methods of language acquisition align with their beliefs about effective instructional methods and their instructional practice when observed a year after the PD as measured by a survey and an observation tool?</td>
<td>Group with PD</td>
<td>Survey Question #9</td>
</tr>
<tr>
<td>4</td>
<td>How do these educators show the same or different sets of beliefs about effective instructional methods aligned to their practice when compared to a group of educators who have not received the same professional development as measured by a survey and an observation tool?</td>
<td>Group with PD</td>
<td>Survey Question #9</td>
</tr>
</tbody>
</table>
Table 3.7 provides a visual of how the data collected in part two was organized. Each phase was aligned to each of the four research questions. Under each phase, the data were analyzed in the order of demographics, language acquisition (question #6 of the survey), second language acquisition (question #7 of the survey), and instructional methods (question #9 of the survey) for phases one and two. Each of the survey questions were broken up into two categories: language development (LD) and language acquisition (LA) to determine whether the comments aligned more to the literature on language development or language acquisition for each of the groups that took the survey. For phases three and four, only the instructional methods (question #9) data were analyzed for the group that received PD and the group that did not receive PD.

Table 3.7

Summary of the Analysis of Data

<table>
<thead>
<tr>
<th>Phases</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHASE ONE</td>
<td></td>
</tr>
<tr>
<td>Demographic Analysis</td>
<td>General Group of Educators</td>
</tr>
<tr>
<td>Language Acquisition Analysis (Q#6)</td>
<td>LD</td>
</tr>
<tr>
<td>Second Language Acquisition Analysis (Q#7)</td>
<td>LA</td>
</tr>
<tr>
<td>Instructional Methods Analysis (Q#9)</td>
<td></td>
</tr>
<tr>
<td>PHASE TWO</td>
<td></td>
</tr>
<tr>
<td>Demographic Analysis</td>
<td>General Group of Educators, Group with PD, and Group without PD</td>
</tr>
<tr>
<td>Language Acquisition Analysis (Q#6)</td>
<td>LD</td>
</tr>
<tr>
<td>Second Language Acquisition Analysis (Q#7)</td>
<td>LA</td>
</tr>
<tr>
<td>Instructional Methods Analysis (Q#9)</td>
<td></td>
</tr>
<tr>
<td>PHASE THREE</td>
<td></td>
</tr>
<tr>
<td>Instructional Methods Analysis (Q#9) for group with PD</td>
<td>Group with PD</td>
</tr>
<tr>
<td>Classroom Practices Analysis for group with PD (observation tool used with yes/no answers)</td>
<td></td>
</tr>
<tr>
<td>PHASE FOUR</td>
<td></td>
</tr>
<tr>
<td>Instructional Methods Analysis (Q#9) for group without PD</td>
<td>Group without PD</td>
</tr>
<tr>
<td>Classroom Practices Analysis for group without PD (observation tool used with yes/no answers)</td>
<td></td>
</tr>
</tbody>
</table>
Validity and Reliability

Muijis (2011) defines validity as measuring what is intended to be measured. In education research, it is often difficult to measure attitudes, self-concept, beliefs, self-esteem, and abstract concepts in the form of numbers. Therefore, instruments are needed to measure concepts indirectly. Designing instruments that measure what researchers purport to measure is a difficult task. Validity is the single most important aspect of the design of instruments in educational research (Muijis, 2011).

Content validity is ensuring the contents of the survey and classroom observations measured the concept the study was intending to measure. In the context of this study, the questions needed to get at the attitudes, beliefs, and actions of the participants on how they believed language was acquired, how they believed a second language was acquired and if there were similarities and/or differences between first and second language acquisition, and what participants believed were the most effective instructional strategies they used with ELs. To ensure content validity, the survey that was sent to participants was “field tested” by a group of 16 doctoral students in the same cohort as the researcher. This team of experts was asked to give feedback on the particular content of the survey questions as well as feasibility of the survey. One expert in the cohort had extensive background in neuroscience, Arwood’s Neuroeducation Model and the NsLLT and was able to give specific feedback on the actual survey. This expert gave feedback on whether the survey questions appeared valid. This is called “face validity” and it was helpful to get the immediate feedback.
Criterion validity is closely related to the theoretical framework of the study (Muijis, 2011) and is evaluated on whether the tools connect to the outcome (concurrent validity) or whether the tools connect to the outcome when administered at a later time (predictive validity). To ensure criterion validity, the survey was field tested with the same cohort mentioned above. The same expert mentioned above in the cohort understood the theoretical framework used in this study in detail and gave feedback on the actual framework and connection to the desired outcome. This expert in the cohort noticed that the introduction of the survey was too long and recommended that based on the content, the respondents did not need to know the full background of the theoretical framework. The expert gave specific feedback on which phrases and sentences were fine to cut but still keep the essence of the idea intact. Feedback was noted and taken into consideration before sending the survey to participants.

Construct validity is a bit more complex that it intends to capture the internal thoughts and causal relationships within the study (Muijis, 2011; Yin, 2009). Construct validity is complex because it incorporates a number of other forms of validity that help in the overall assessment of construct validity (Messick, 1980). The researcher attempted to demonstrate construct validity by communicating with the observer to clarify points and to determine whether the questions on the observation tool aligned to the theoretical framework and the research questions. The researcher also reviewed the survey questions to ensure the questions on the survey aligned with the questions on the observation tool. For example, the observation tool asked specific questions around the participants’ classroom practice. The questions were specific to
the implementation of a Neuroeducation Model. The survey asked about the participants’ beliefs around language acquisition, second language acquisition, and best instructional methods. The researcher made sure the questions asked in the survey aligned with the questions on the observation tool and that by aligning the data between the survey and observation tool the two different measurement procedures were measuring the same construct.

The researcher also attempted to reach construct validity by aligning the questions on the observation tool to the literature that supports ANM and the NsLLT. Constructs are key features that must be definable in a theory, in this case the NsLLT. Table 3.8 shows how the researcher connected the constructs of the NsLLT to the questions in the observation tool.

Table 3.8

Construct Validity of Classroom Observation Tool

<table>
<thead>
<tr>
<th>Observation Tool Question</th>
<th>Literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is there evidence of Viconic Language Methods (VLMs)?</td>
<td>“The brain sees everything I know.</td>
</tr>
<tr>
<td></td>
<td>But the eye only sees the patterns.</td>
</tr>
<tr>
<td></td>
<td>To see what I know;</td>
</tr>
<tr>
<td></td>
<td>I need to be able to learn what I see.”</td>
</tr>
<tr>
<td></td>
<td>NsLLT’s underlying theme is using visual pathways to learn concepts that</td>
</tr>
<tr>
<td></td>
<td>are overlapped and then using language to name the concepts. The Viconic</td>
</tr>
<tr>
<td></td>
<td>Language Methods (VLMs) consists of a series of strategies that align to</td>
</tr>
<tr>
<td></td>
<td>this key theme. English is an auditory language and about 95% of the</td>
</tr>
<tr>
<td></td>
<td>population learns in a visual way. In order to align an auditory language</td>
</tr>
<tr>
<td></td>
<td>such as English to a visual thinker, Arwood and Brown (2002) developed</td>
</tr>
<tr>
<td></td>
<td>visual methods as a way to facilitate the visual processing of language</td>
</tr>
<tr>
<td></td>
<td>that names concepts using an auditory</td>
</tr>
<tr>
<td>Question</td>
<td>Answer</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Can I see what the teacher is doing without any words being used to explain what is done?</td>
<td>Students use light and movement as semantic features of visual patterns that can be seen through drawing or flowcharting. They use these visual patterns to overlap the oral and written word patterns they see and hear so they are able to tag the concepts with language. When teachers draw out concepts while speaking in real time, students are able to use their neurobiological learning systems to make connections to the concepts they are seeing being created. As students watch the teacher’s hand move, this allows for multiple sensory inputs to aide in the inhibition and integration of perceptual patterns therefore strengthening neural networks and increasing the complexity of language function.</td>
</tr>
<tr>
<td>Can I see what the students are intended to do on a specific task without any words being used to explain the task?</td>
<td>Similar to the explanation above, students need to see themselves in the task or event in order for them to understand the concepts they are learning. Using visual patterns or strategies will help students make the sensory input connections to the concepts. Students need to overlap their own conceptual pictures with the content of the task they need to complete in order to allow for more depth in meaning. Depth in meaning begins with the student’s thinking. Strategies such as visual concept dictionaries are examples of how students can share what they are intending to do without using words to explain the task.</td>
</tr>
<tr>
<td>Are the learners participating in an event?</td>
<td>One of the linguistic functions is extension where the process by which meaning is added to the underlying thoughts or concepts increases in complexity (Arwood, 2011). Also, semanticity is another linguistic function (Arwood, 2011) that allows the learner to increase their understanding of the concept by increasing the meaning or scaffolding of meaning onto what the learner already knows and building off of that prior learning. In order to connect meaning to</td>
</tr>
<tr>
<td>Question</td>
<td>Answer</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Are the learners resourcing materials for information gathering?</td>
<td>Students need to use multiple resource materials to gather information needed to understand the concepts they are learning. Multiple resource materials include books, encyclopedias, articles, journals, newspapers, magazines, search engines, etc.</td>
</tr>
<tr>
<td>Are there multiple varieties of resource materials for students to use as an agent within an event?</td>
<td>In order to see themselves in the event, multi-modal strategies must be used. The eyes and ears need to see and hear the input or content from many different perspectives and modes of learning. This allows for multi-modal sensory input to strengthen the neural networks. Multiple resource materials include books, encyclopedias, articles, journals, newspapers, magazines, search engines, etc.</td>
</tr>
<tr>
<td>Are the learning opportunities progressing developmentally?</td>
<td>Students begin learning new concepts at the preoperational level especially if they do not have any background knowledge on the topic. Lessons need to start at the preoperational level and then progress to concrete and then to formal levels. For example, if teachers are presenting a math story problem from a caterpillar’s point of view, the teacher will need to share a preoperational story about a time they saw or touched a caterpillar. Then, the story needs to increase in complexity to ultimately reach the formal concept of the importance of caterpillars in the larger ecosystem.</td>
</tr>
<tr>
<td>Is the learning environment organized by space?</td>
<td>Students need to have multiple ways of organizing their learning. For example, students start the learning process in pairs and then there are opportunities for them to move into groups of two or three. Then, students are able to move to different parts of the room to access multiple resources. This helps with their multi-sensory input that ultimately helps strengthen the neural networks.</td>
</tr>
</tbody>
</table>
Do the learners have individual strategy checklists to help them advocate for their own learning?  

Pro-social behavior is the result of students learning the concepts that correspond to them as agents. Students learn to behave because they learn to think. Having individual strategy checklists helps students advocate for their own learning and it helps them become agents of their learning. When they complete tasks, they feel successful and a contributor to the learning environment. “As a child becomes an agent, the child’s behavior or social acts reflect the child’s thinking about social development. Social development requires thinking about one’s own behavior as well as the behavior of others (Arwood & Young, 2000; Winner, 2002, 2007)” (Arwood, Brown, & Kaulitz, 2015, p. 135).

Are learning opportunities organized by space?  

Students also need different opportunities to learn concepts. This can happen through individual think time and then move to pair-share activities and then small and whole group activities.

The way in which this study was designed allowed for construct validity to take place by using multiple data sources from educators with a variety of expertise in order to corroborate data more effectively and cohesively. However, construct validity takes time to fully achieve and may not be always achieved in a single study.

Reliability is the degree to which the instrument consistently measures the intended outcome over a period of time when repeated (Roberts, 2010). To ensure reliability, the researcher used the same instruments such as a survey and classroom observation tool with all participants without modification. Modifications were not made to the instruments once the survey was sent and classroom observations took place.
Ethical Considerations

Dillman, Smyth, and Christian (2009) note that some organizations require that surveys, questionnaires, and implementation protocols be reviewed and approved by an Institutional Review Board (IRB). The purpose of this group is to ensure that the proper steps are taken to protect the rights of human research subjects. Before conducting any study and collecting the necessary data for this study, the appropriate forms were submitted to the University and the district IRBs to obtain approval for this study. The researcher adhered to all IRB policies and regulations while conducting the human subjects research.

There was potential for risks and/or discomfort at every phase of this study. The risk in conducting the survey was that there was no way to determine or control participants from taking the survey more than once. They might have been able to use multiple computers to take the same survey. This potentially impacted validity and reliability of the survey results. Another risk was that the researcher was the Administrator for Multilingual Programs and in charge of overseeing the program design and outcomes for ELs. ELD teachers may have felt uncomfortable sharing their true feelings or thoughts in fear of losing their jobs. The researcher needed to assure participants that their comments would be kept completely confidential and no negative comments would be held against them. They needed to feel safe when responding to these survey questions.

To minimize the discomfort, the researcher shared that confidentiality would be protected through the use of pseudonyms. Pseudonyms were used to ensure no information included in the analysis of the study would make it possible to identify the
school district, participants, or individual schools. Transcriptions and additional documents obtained by participants included only pseudonyms. Individual quotes used as part of the analysis were not used unless there were multiple participants expressing the same thoughts to avoid any opportunity for individuals to be identified.

To protect the data, the researcher used an external hard drive to keep all transcriptions and artifacts collected throughout the process. The external hard drive was a personal hard drive and not purchased using district funds as any items purchased by the district is owned by the district and can be confiscated or subpoenaed at any time. Six months after the defense, all survey comments and transcriptions will be erased from the hard drive.

Before conducting the observations, participants were asked to sign a consent form that provided the participants with background information on the purpose of the study, procedures for the interview, risks and benefits of being in the study, confidentiality, voluntary nature of the study, and contact information for the researcher. The participants were given a copy of the signed consent form. The consent form can be found in Appendix H.

Participants did not receive any direct compensation for their participation in the study. The benefits included the opportunity to discuss professional experiences and in all phases of the study participants had an opportunity to provide suggestions or offer their advice on how we should respond to the dilemma of understanding the difference between language acquisition and language development. According to Blau (1964) and Homans (1961), many people feel a sense of reward knowing they have helped others. It is the hope that participants experienced some intrinsic value in
contributing to a possible shift in aligning beliefs around language acquisition to their classroom practice.

**Role of the Researcher**

Qualitative researchers must make a conscious effort to avoid adopting preconceived ideas and assumptions in research (Charmaz, 2006). Given this study included a survey and classroom observation portion where the researcher was highly involved in the data analysis process, it was important the researcher separated personal and professional experience and practice from a study conducted in the same organization in which the researcher worked. It was important to limit the researcher’s influence and bias on the outcome of the study by including in vivo codes taken directly from the respondents and by using actual comments made by the observer during the classroom observations since the researcher was not the one that completed the observations.

The researcher recognizes she is an American-born citizen from Guam where English was not her first language. Although she grew up speaking two languages, she learned to speak Spanish, a third language, as an adult. The researcher has been in public education for about 15 years and has experience teaching ELs at the middle and high school levels. She served as an ELD teacher, a foreign language teacher, an assistant principal and principal at the middle level in two different schools. The researcher currently serves as the Administrator for Multilingual Programs in the same district that is the subject of this study and oversees the ELL, Dual Language, Migrant, Newcomer and Native American programs. As an ELD teacher 13 years ago, the researcher recognized fairly quickly there was a gap in the literature on language
acquisition and language development, as there existed few studies conducted on this topic; hence, the purpose and rationale for conducting this study. Given the vast experience in working with ELs, the researcher wrote reflective notes throughout the data collection process in order to actively monitor her preconceptions on this topic and to avoid bias.

**Limitations**

There were several limitations to this study. One limitation is that the sampling method used in this study was convenience sampling. Although there are advantages to this type of sampling method such as simplicity of sampling, cost effectiveness, and shorter duration of data collection, there are also disadvantages. Convenience sampling opens the door for high vulnerability to bias and influences outside of the researcher’s control. The researcher knew all of the participants and visited the classrooms of all teachers that received PD so strengths and areas of growth were observed prior to the study. The researcher is also an administrator in the same district as the participants and oversees the department responsible for ELs, which could be seen as a limitation in that participants may have behaved differently if the researcher was not connected to the district. The advantage, however, may be familiarity and a sense of comfort of knowing the researcher.

To control for bias and to meet the district’s guidelines for classroom observations, the researcher hired an outside observer to conduct the classroom observations of the eight participants. This outside observer was well versed in the literature surrounding language acquisition and language development as well as Arwood’s Neuroeducation Model. Although the researcher and the observer did
everything possible to avoid potential bias during the classroom observations, observer bias, in this case, was hard to control for. Therefore, this could be seen as a limitation.

Another limitation is how generalizable the study is to other districts. The scope of this study may appeal to other districts serving ELs, however, applying this same study in a different district with different demographics or size may be difficult as other districts may have different theories of learning already in place that may or may not impact teacher perceptions and beliefs. Also, other districts run different program models for teaching English to ELs and these program models may impact the attitudes of educators teaching in these varying models.

The eight select participants that were observed as part of the study received the classroom observation tool ahead of time, one week in advance. This could be viewed as a limitation in that they could have prepared a lesson that aligned to the tool, which was already aligned to the neuroeducation and NsLLT lens. Also, the visits were scheduled ahead of time so the participants were aware of when the observer was going to visit their classroom. This may have skewed the data in aligning beliefs and practice to either acquisition or development. It is common courtesy in the district that is the subject of this study to share the observation tool or evaluation criteria with teachers before administrators or outside observers enter the classrooms. However, given the results of this study and given that all participants received the tool in advance, the group without PD still did not align their beliefs to practice. This outcome may justify the need for PD and that a tool alone will not impact practice. PD is needed to strengthen the bond between beliefs and practice. To
reduce this limitation, participants would not be given the tool ahead of time and this should be mentioned to them at the time of giving consent to participate in the study.

Question nine of the survey (Appendix B) sent to participants, including the eight select participants asked participants what key instructional methods should be used to teach English to ELs and how effective the methods are at helping ELs reach proficiency in English. During the first and second cycle coding processes, the researcher discovered another limitation of the study in that the question asked participants simply to name the instructional strategies but did not ask participants to describe how they would use the actual strategies. Acquiring a language is a neurobiological and socio-cognitive (cultural) process according to the literature and the strategies used to help students acquire a language are dependent on how the strategy is actually used. For example, multimodal strategies are excellent strategies to help students acquire a language using the neuroeducation and NsLLT lens (only if sound does not eliminate the thinker’s pictures). However, multimodal strategies alone will not help students acquire language. It is in how teachers use the strategies that will determine acquisition or development. To reduce this limitation, the wording of the survey question could ask for how specifically the participants would use the strategies.

The timing of when the data was collected could be a limitation as the timing may have impacted the emotional state of participants. The survey was sent out in November before the Thanksgiving break and the deadline given was right before the winter break in December so educators may not have felt the urgency to fill out the survey or may not have found time to do this while preparing for the break. To reduce
this limitation, the survey could be given at the start of the school year or a month into the school year.

Another limitation was that participants were selected from a single district so beliefs and attitudes were somewhat consistent given the setting of the study. This impacted the diversity of responses. The total number of participants that received PD and that did not receive PD may be a limitation as the sample size was fairly small, eight participants. There were 200 participants that received the PD and only four were selected to participate in the study. To reduce this limitation, other participants from other districts could be invited to participate in the study with permission from district personnel.

**Summary**

This chapter described the qualitative methods used in this study. The study was conducted in two parts: 1) the development of a theoretical model based on neuroeducation and alignment to the pedagogical shifts, and 2) the application of the model on the analysis of the beliefs and practice of teachers. The second part of the study occurred in four phases. These phases allowed the researcher to collect data to address the research questions outlined for the study. The university and the district Institutional Review Boards provided the protection to human subjects that were part of this research study. This study involved one school district. Validity and reliability were addressed and accounted for throughout the process of developing the evaluation tools, collecting the data, and analyzing the data. The researcher provided ethical considerations and reviewed her personal bias. Lastly, this chapter outlined the limitations of this study such as the use of convenience sampling, observer bias,
providing the tool ahead of time, generalizability of the study to other districts, the
design of question nine of the study, the timing of when the survey was given to
participants, and participant sampling in a single district. The next chapter will
provide the results of the study.
Chapter Four

Results

The purpose of this qualitative study was twofold: (1) To determine if the Arwood Neuroeducation Model (ANM) supports the pedagogical shifts recommended by Heritage, Walqui, and Linquanti (2015); and (2) If those district educators with and without a professional background in both the pedagogical shifts and in educating ELs based on the ANM show beliefs about language development and/or language acquisition that are aligned with their classroom practices.

This chapter is organized into two parts with each part addressing the two purposes of the study. The first part of this chapter examined the alignment between the ANM and the pedagogical shifts and the second part examined the impact of beliefs to classroom practice. To address the research questions, Chapter 2 provided the literature to support the study and Chapter 3 outlined the methods and procedures used for the study. This chapter provides the results of the research.

Analysis of Arwood’s Neuroeducation Model and the Pedagogical Shifts

The first purpose of the study was to use an existing theoretical model based on neuroeducation to support a shift in educational practices for ELs. Chapter Two discussed the pedagogical shifts proposed by Heritage, Walqui, and Linquanti (2015) as viewed through the ANM, specifically through the pertinent literature from the fields of cognitive psychology, language theory, and neuroscience related to these
proposed shifts. Figure 4.1 shows how SLA theories that underlie each of the three shifts as well as some of the SLA theories mentioned in Chapter Two fit within ANM in order to propose a shift in establishing a place for this model and theory in the field of SLA. Figure 4.1 also highlights the heavy concentration of SLA theories and approaches in the field of cognitive psychology, which aligns with Atkinson’s (2015) claim that the field of SLA is heavily grounded in cognitivism. Also, at the center of the diagram, the missing “glue” or “nexus” is the NsLLT that brings all three fields together. However, without more literature to support language function and neuroscience, there is an imbalance of evidence to claim that ANM supports the pedagogical shifts recommended by Heritage, Walqui, and Linquanti (2015).

Figure 4.1. SLA Theories and Approaches and Arwood’s Neuroeducation Model

Table 4.1 provides the alignment between the ANM and the three selected Heritage, Walqui, and Linquanti (2015) pedagogical shifts that is not intended to disregard the current paradigm of SLA but it is intended to enhance, to add to, and
most importantly, to fill in the gaps of the current literature dominating the field of SLA as reflected in Figure 4.1 above.

Table 4.1  

**Alignment of ANM and Shifts Proposed by Heritage, Walqui, and Linquanti (2015)**

<table>
<thead>
<tr>
<th>Current SLA Practices</th>
<th>Recommended Shifts in Practice</th>
<th>ANM Literature Aligns with these Practices</th>
</tr>
</thead>
</table>
N. In order to understand the individual learner “it is necessary to understand the social relations in which the individual exists” (Wertsch, 1991, p. 26).  
O. Learning involves students playing and taking an active role in their learning (Vygotsky, 1978, 1986).  
P. Pragmatics is the study of the function of language used to represent social development (Arwood, 2011; Peirce, 1902). |
R. Data suggest that within a large area of the brain, there are small, compact zones with relatively narrow functions, but all of these zones interact to a high degree with one another (Bookheimer, 2002, p. 182).  
S. Language and language functions are distributed in wide networks involving multiple regions of the brain (Vigneau et al., 2006). |
| Activities that pre-teach content (Doughty & Long, 2003; Early Chomsky, 1957; Heritage, Walqui, & Linquanti, 2015) | Activities that scaffold students’ development and autonomy as learners (Heritage, Walqui, & Linquanti, 2015; Gibbons, 2002; Walqui, 2008; Walqui & van Lier, 2010) | T. Learning a second language mediates changes in the brain such as the electrical activity, location, and structure of the brain (Osterhout, Poliakov, Inoue, McLaughlin, Valentine, Pitkanen, Frenck-Mestre, & Hirschensohn, 2008). U. A neuroscience lens posits that the brain creates pathways for acquisition through the process of inhibition and integration of sensory information; the brain uses this sensory information to strengthen neural structures; the brain will rewire around the neural structures that do not provide strong feedback that allows for integration and inhibition of new sensory information to take place. Therefore, experience has the ability to change both the function and the structure of the brain (Baars & Gage, 2010; Draganski, Gaser, Busch, Schuierer, Bogdahn, & May, 2004; Genesee, 2001; Münte, Altenmüller, & Jäcke, 2002; Pulvermüller, 2016; Scalise & Felde, 2017; van Praag, Kempermann, & Gage, 2000; Whitman & Kelleher, 2016). |
Figure 4.2 shows how the first pedagogical shift and the additional ANM lens fills in the ANM framework. Heritage, Walqui, and Linquanti (2015) proposed a shift away from seeing language acquisition as an individual process to understanding language acquisition as a social process. The visual shows how adding literature aligned to ANM fills in the gaps and enhances the shifts, particularly, literature specific to social interaction and how students taking an active role in their learning helps them acquire language. The social interaction has to be meaningful to students so they are able to make connections with what they are learning.

M. Learners acquire concepts through social interaction that is meaningful to them
N. In order to understand the individual learner “it is necessary to understand the social relations in which the individual exists”
O. Learning involves students playing and taking an active role in their learning
P. Pragmatics is the study of the function of language used to represent social development

---

Figure 4.2. Shift #1 and Alignment to Arwood’s Neuroeducation Model
Figure 4.3 shows how the second pedagogical shift and the additional ANM lens fills in the ANM framework. Heritage, Walqui, and Linquanti (2015) proposed a shift away from seeing language acquisition as a linear and progressive process aimed at accuracy, fluency, and complexity to understanding that acquisition occurs in non-linear and complex ways. The visual shows how adding literature aligned to ANM fills in the gaps and enhances the shifts, particularly, literature specific to studies of the brain and understanding that multiple regions of the brain are activated when language is acquired adding to the complexity of the acquisition of language. Students acquire language in many different ways using multiple regions of the brain.

Q. “The broadly defined terms Broca’s area and Wernicke’s area do not correspond with the reality of how language processes are organized in the brain”

R. Data suggest that within a large area of the brain, there are small, compact zones with relatively narrow functions, but all of these zones interact to a high degree with one another

S. Language and language functions are distributed in wide networks involving multiple regions of the brain

Figure 4.3. Shift #2 and Alignment to Arwood’s Neuroeducation Model
Figure 4.4 shows how the third pedagogical shift and the additional ANM lens fills in the ANM framework. Heritage, Walqui, and Linquanti (2015) proposed a shift away from activities that pre-teach content to activities that scaffold students’ development and autonomy as learners. The visual shows how adding literature aligned to ANM fills in the gaps and enhances the shifts, particularly, literature specific to studies of how learning a second language mediates changes in the brain and how experience has the ability to change the structure of the brain. Scaffolding instruction for students allows for the strengthening of neural structures, which leads to the restructuring of the brain.

Figure 4.4 also shows that with the addition of multiple lenses and multiple perspectives from other fields of science, the field of SLA can be enhanced and strengthened. Additionally, the “glue” or “nexus” that holds all three fields together, the NsLLT, can now be added to the center of the diagram showing an alignment between the pedagogical shifts and ANM. The NsLLT defines learning as a dynamic process (non-linear/complex) between the language user, meaningful sensory input (social process), and the outside user of language helping name the input in order for the learner to make sense of this input (social process/scaffolding) (Arwood, 1983; 2011).
This part of the study investigated the beliefs of educators on how ELs acquired language and determined how those beliefs translated to classroom practice. The second part of this chapter provides the results for the second purpose of the study. The researcher examined whether the data collected fit within the language development or language acquisition categories as defined in Chapter Two, and if the participants that received PD on those differences made a paradigm shift toward the implementation of the neuroeducation framework in their practices. The analysis for this part of the study was broken up into four distinct phases each aligned to the four research questions described in Chapter Three. Each phase starts by stating the research question, the purpose of the question, a summary of the findings from the analysis, and then the phases end by including the data of the study for each research question.
**Phase One Results**

Phase one of the study involved sending a survey to participants across the district (see Appendix B). This phase was designed to answer the first research question: *Do the general beliefs of educators in the district align more to the literature around language acquisition or language development as measured by a survey?*

The purpose was to see if there was a connection between the beliefs of educators in the district and the literature on language acquisition and/or language development in three areas: language acquisition, second language acquisition, and instructional methods for teaching English to ELs.

The majority of submitted surveys were completed by lower elementary educators (Pre-K to 3 grade) representing 32% of responses followed by upper elementary representing about 26% of the responses. Elementary level (PK-5) represents over half of the total surveys (58%) submitted. Secondary level, which includes middle and high levels represents about 36% of the total surveys submitted. District level administrators represent only about 3% of the total surveys. The number of grade levels submitted total 450 out of 352 surveys submitted, which indicates that some educators teach across levels and were able to check more than one level. About 46% of respondents fell within the 11-20 years of experience range followed by 24% in the twenty-one and over range. Three educators had over thirty years of experience. Only 12% of respondents are fairly new to the profession between 0-5 years of experience and 17% with 6-10 years of experience.
The results indicate that the general beliefs of educators in the district on how students acquire language as well as a second language aligned more to the research on language development except for best instructional methods for teaching English to ELs which aligned more to the research on language acquisition. Figure 4.5 provides a visual of this alignment and Table 4.2 provides a summary of these beliefs and alignment to either the literature around language acquisition or language development.

![Diagram](image)

*Figure 4.5. Phase One Visual, General beliefs aligned to development or acquisition*
Table 4.2

*Summary of Beliefs around Language Development and Language Acquisition*

<table>
<thead>
<tr>
<th>Survey Questions</th>
<th>General Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is your understanding of how language is acquired?</td>
<td>LD</td>
</tr>
<tr>
<td>What is your understanding of how students acquire a second language? What difference is there, if any, between first and second language acquisition?</td>
<td>LD</td>
</tr>
<tr>
<td>What are key instructional methods that should be used to teach English to ELs and how effective are these methods at helping ELs reach proficiency in English?</td>
<td>LA</td>
</tr>
</tbody>
</table>

Note. LA=Language Acquisition; LD=Language Development

The results of the survey for this phase of the study were analyzed by completing the first and second cycle coding processes. The analysis of results is organized by language acquisition (aligned to question 6 of the survey), second language acquisition (aligned to question 7 of the survey), and instructional methods (aligned to question 9 of the survey).

**Language Acquisition Analysis (Question #6 of the Survey)**

The survey (see Appendix B) sent to 500 participants asked the question: *What is your understanding of how language is acquired?* After the second cycle coding of the responses by participants, several themes emerged that fit into specific categories of thinking around language acquisition as well as language development. The general themes from respondents fit into these two categories.

The themes that fit under the language development category were stages, direct/explicit instruction, hard-wired to learn language, language modalities, and
Themes that aligned to the literature around language acquisition were socio-cognitive interactive process, senses and meaning, multimodal, native language support, and continual process. Although these codes could be fluid and run through and between the two categories, based on the actual comments made by respondents, the themes were organized and placed in the categories using the theoretical framework outlined for the study.

Table 4.3 includes the different themes mentioned above including the frequency and percentage based on the overall number of themes coded. There were a total of 288 frequencies of comments made between language development and language acquisition. The language development themes represent about 86% of the total themes and the language acquisition themes represent about 14% of the total frequencies.
Table 4.3

Frequency of Language Development and Language Acquisition Themes

<table>
<thead>
<tr>
<th>Language Development Codes</th>
<th>Frequency, $n$</th>
<th>Percentage</th>
<th>Language Acquisition Codes</th>
<th>Frequency, $n$</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stages</td>
<td>24</td>
<td>9.68</td>
<td>Socio-cognitive</td>
<td>11</td>
<td>27.50</td>
</tr>
<tr>
<td>Direct/Explicit Instruction</td>
<td>52</td>
<td>20.97</td>
<td>Interactive Process</td>
<td>13</td>
<td>32.50</td>
</tr>
<tr>
<td>Hard-Wired to Learn Language</td>
<td>13</td>
<td>5.24</td>
<td>Senses and Meaning</td>
<td>13</td>
<td>32.50</td>
</tr>
<tr>
<td>Language Modalities</td>
<td>66</td>
<td>26.61</td>
<td>Multimodal</td>
<td>6</td>
<td>15.00</td>
</tr>
<tr>
<td>Environment</td>
<td>93</td>
<td>37.50</td>
<td>Native Language Support</td>
<td>6</td>
<td>15.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Continual Process</td>
<td>4</td>
<td>10.00</td>
</tr>
<tr>
<td>Total</td>
<td>248</td>
<td>100.00</td>
<td>40</td>
<td>100.00</td>
<td></td>
</tr>
</tbody>
</table>

Note. Overall frequency: $n=288$ total responses; Language Development $n=155$, Language Acquisition $n=40$; percentage=100.00

An initial analysis of the comments by participants indicates that the general beliefs of educators in the district aligned more to the literature around language development (248) rather than language acquisition (40). This is after first and second cycle coding of the survey question, which inquired about the participants’ understanding of how language was acquired.

Second Language Acquisition Analysis (Question #7 of the Survey)

The same survey as in the previous section (see Appendix B) asked the question: *What is your understanding of how students acquire a second language?*  *What difference is there, if any, between first and second language acquisition?*

Similar to the previous section on language acquisition, the analysis of this question
was categorized into two areas: language development and language acquisition during the second cycle coding process.

The themes that fell under the language development category were stages, direct/explicit instruction, hard-wired to learn language, transference, environment, students, and sheltered instruction. The themes that fell under the language acquisition category were socio-cognitive interactive process, neurological factors, and scaffolding. Table 4.4 highlights the general themes that fell under the two categories. There were a total of 213 frequencies of comments made between language development and language acquisition. The language development themes represented about 90% of the total frequencies and the language acquisition themes represented only about 10% of the total frequencies.
An initial analysis of the comments by participants around SLA indicated that the general beliefs around SLA aligned more to the literature around language development rather than language acquisition because 90% of the themes fell under this category. This alignment to language development also correlated to the results in the previous section on language acquisition where comments by respondents aligned more to the literature around language development. Therefore, their beliefs match the SLA literature grounded in developmental products, stages, and cognitivism.
Instructional Methods Analysis (Question #9 of the Survey)

Question nine of the survey (see Appendix B) asked: *What are key instructional methods that should be used to teach English to ELs and how effective are these methods at helping ELs reach proficiency in English?*

As in the previous sections, the themes were organized using the neuroeducation lens and divided into language development and language acquisition categories as shown in Table 4.5 below. The themes that fell under language development were *structures, language modalities, and sheltered instruction*. The themes under language acquisition were *safe and inclusive environment, native language support, socio-cognitive interactive process, multi-modal, language in context, and NsLLT*. Language development codes represented 47% of the total frequencies. The codes for language acquisition yielded a frequency of about 53% of the total frequency count of 400.
An initial analysis of the comments by participants around instructional methods indicated that the general beliefs around the best instructional methods for teaching English to ELs aligned more to the literature around language acquisition rather than language development. So, there is a disconnect between their beliefs about the acquisition of language and beliefs about best instructional methods.

**Phase Two Results**

Phase two of the study involved sending the same survey to a group of eight select participants of which four received PD on the NsLLT lens within the ANM and four did not receive any PD. This phase was designed to answer the second research
question: *How do these general beliefs compare to the beliefs of educators that received professional development and those that did not receive professional development in the differences between language acquisition and language development as measured by a survey?*

The purpose of this phase was designed to compare the beliefs of the general staff, the participants that received PD, and the participants that did not receive PD on how language was acquired, how a second language was acquired, and what instructional methods were best for teaching English to ELs. These eight participants were invited to take part in the study. These eight participants also agreed to being observed by an unknown person observing one time. The observer used an observation tool aligned with the neuroeducation lens about how language is acquired. The participants were asked not to prepare any special lesson for the observation although they did receive the observation tool a week in advance, which may have caused bias in teaching to the tool. This potential bias is addressed in the limitations section in Chapter Five. All observations were tape recorded and transcribed. The observations ranged from 40 minutes to 90 minutes in length. Recordings and transcriptions were stored in an external hard drive only accessible by the researcher. Similar to the previous phase, participants answered three open-ended questions on the survey (see Appendix B). Table 4.6 summarizes the alignment from all three groups and Figure 4.6 provides a visual of the triangulation that took place in phase two of this study.
Table 4.6

Summary of Beliefs around Language Development and Language Acquisition

<table>
<thead>
<tr>
<th>Survey Questions</th>
<th>General Group</th>
<th>Group with PD</th>
<th>Group w/o PD</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is your understanding of how language is acquired?</td>
<td>LD</td>
<td>LA</td>
<td>LD</td>
</tr>
<tr>
<td>What is your understanding of how students acquire a second language? What difference is there, if any, between first and second language acquisition?</td>
<td>LD</td>
<td>LD</td>
<td>LD</td>
</tr>
<tr>
<td>What are key instructional methods that should be used to teach English to ELs and how effective are these methods at helping ELs reach proficiency in English?</td>
<td>LA</td>
<td>LA</td>
<td>LA</td>
</tr>
</tbody>
</table>

Note. LA=Language Acquisition; LD=Language Development
The findings for this phase of the study indicate that the beliefs among the three groups varied between language development (structures) and language acquisition (socio-cognitive interactive process, native language support, and multimodal). It would be difficult to state with conviction that the beliefs aligned more to either language development or language acquisition. The beliefs around second language acquisition aligned to the literature on language development across all groups. However, the beliefs around instructional methods aligned more to the literature on
language acquisition again, across all groups. It was interesting to learn that the beliefs of the general group aligned with the beliefs of the group that did not receive PD since the general group included a larger body of educators that received PD on neuroeducation and NsLLT. The group that received PD differed in alignment with the group that did not receive PD only for the first question on their beliefs around language acquisition.

The results of this survey were analyzed after completing the first and second cycle coding processes. Again, similar to the previous phase, the results were broken down by language acquisition (aligned to question 6 of the survey), second language acquisition (aligned to question 7 of the survey), and instructional methods (aligned to question 9 of the survey). The four teachers that received PD taught in varying levels. Two of the teachers taught in a middle school, one teacher in an elementary school, and one teacher from a high school. As for years of experience in education, 50% of these teachers had between 11-20 years of experience and 50% of them had over 21 years of experience in education.

**Language Acquisition Analysis (Question #6 of the Survey)**

The survey (see Appendix B) sent to eight participants asked the question: *What is your understanding of how language is acquired?* The second cycle coding process for the participants that received PD resulted in several themes: *socio-cognitive interactive process, native language support, multimodal, and structures.* Using the neuroeducation lens, these themes were placed into two different categories: language development and language acquisition. Table 4.7 shows which themes fell under the two categories and the frequency. Overall, 79% of the frequencies of
comments aligned to the language acquisition literature and only about 21% of the comments aligned with the literature on language development. This means that the general beliefs of participants that received PD on the Neuroeducation Model and NsLLT shared the same beliefs as the general group.

Table 4.7

*Frequency of Themes*

<table>
<thead>
<tr>
<th>Themes</th>
<th>Frequency, n</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Language Acquisition Themes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Socio-cognitive Interactive Process</td>
<td>7</td>
<td>46.67</td>
</tr>
<tr>
<td>Native Language Support</td>
<td>2</td>
<td>13.33</td>
</tr>
<tr>
<td>Multimodal</td>
<td>6</td>
<td>40.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>15</td>
<td>100.00</td>
</tr>
<tr>
<td><strong>Language Development Themes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Structures</td>
<td>4</td>
<td>100.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>4</td>
<td>100.00</td>
</tr>
</tbody>
</table>

*Note. Overall frequency: n=19 total responses; percentage=100.00*

The second cycle coding process for the participants that did not receive PD resulted in two main themes that were easily categorized as: *language acquisition* and *language development*. Table 4.8 shows which codes fell under each category.
Table 4.8

**Language Development versus Language Acquisition**

<table>
<thead>
<tr>
<th>Language Development</th>
<th>Language Acquisition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starts with imitation of parents and then with spoken language attached to objects,</td>
<td>Zone of proximal development; Vygotsky</td>
</tr>
<tr>
<td>things, wants, etc.; stages</td>
<td></td>
</tr>
<tr>
<td>Developed into much more complex language with higher vocabulary, sentence</td>
<td>Language acquisition takes time and is a continual process</td>
</tr>
<tr>
<td>structures, grammar, etc.; structures of language</td>
<td></td>
</tr>
<tr>
<td>Language acquisition requires repetition in oral practice</td>
<td></td>
</tr>
<tr>
<td>Language acquisition is acquired through reading, writing, speaking, and listening</td>
<td></td>
</tr>
<tr>
<td>Language is acquired through exposure to the target language</td>
<td></td>
</tr>
<tr>
<td>Process by which people develop the capacity to perceive, communicate, and</td>
<td></td>
</tr>
<tr>
<td>comprehend a language</td>
<td></td>
</tr>
<tr>
<td>Language is acquired through use and practice of the language</td>
<td></td>
</tr>
</tbody>
</table>

Table 4.9 shows the frequencies of comments under the two categories of language development and language acquisition. Using these frequencies, it could be said that majority (about 67%) of the participants that did not receive PD shared beliefs that aligned with the literature on language development. It should also be noted that although majority of the responses align to the literature on language development, there were some references that aligned well to the literature on language acquisition.
Table 4.9

*Frequency of Language Development and Language Acquisition Themes*

<table>
<thead>
<tr>
<th>Themes</th>
<th>Frequency, n</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language Development Themes</td>
<td>7</td>
<td>77.78</td>
</tr>
<tr>
<td>Language Acquisition Themes</td>
<td>2</td>
<td>22.22</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>9</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

*Note. Overall frequency: n=9 total responses; percentage=100.00*

**Second Language Acquisition Analysis (Question #7 of the Survey)**

The second cycle coding process grouped the different comments from participants that received PD into several themes: *socio-cognitive interactive process, native language support, transference, and direct/explicit instruction*. Using the neuroeducation lens, these themes were placed into two different categories: language development and language acquisition. Table 4.10 outlines which of the themes fall under the two categories and their respective frequencies. Using these frequencies, it can be said that the participants that received PD share beliefs that align with the literature on language development when it comes to second language acquisition. It should also be noted that although there were some frequencies and codes that aligned to the literature on language acquisition, majority of the frequencies came from the *direct/explicit instruction* code for second language acquisition which means that most of the participants that received PD believe that a second language should be taught explicitly.
The second cycle coding process for the participants that did not receive PD resulted in four main themes that were somewhat different than the group that received PD. The themes were: *transference, stages, structures, and first and second languages are similar*. Most of the participants answered both parts of the question in depth and using the neuroeducation lens, the themes were organized into two categories: *language development* and *language acquisition*. Table 4.11 highlights which themes fell under each category.

Table 4.10

*Frequency of Language Development and Language Acquisition Themes*

<table>
<thead>
<tr>
<th>Themes</th>
<th>Frequency, n</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Language Acquisition Themes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Socio-cognitive Interactive Process</td>
<td>2</td>
<td>14.29</td>
</tr>
<tr>
<td>Native Language Support</td>
<td>2</td>
<td>14.29</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>4</td>
<td>28.57</td>
</tr>
<tr>
<td><strong>Language Development Themes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transference</td>
<td>4</td>
<td>28.57</td>
</tr>
<tr>
<td>Direct/Explicit Instruction</td>
<td>6</td>
<td>42.86</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>10</td>
<td>71.43</td>
</tr>
</tbody>
</table>

Note. Overall frequency: *n*=14 total responses; percentage=100.00
Table 4.11

*Language Development versus Language Acquisition*

<table>
<thead>
<tr>
<th>Language Development</th>
<th>Language Acquisition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transference</td>
<td>First and Second Languages are Similar</td>
</tr>
<tr>
<td>Stages</td>
<td></td>
</tr>
<tr>
<td>Structures</td>
<td></td>
</tr>
</tbody>
</table>

Table 4.12 shows the frequencies of comments under language development and language acquisition categories. Based on these figures, participants that did not receive PD share beliefs that align with the literature on language development similar to the group that received PD. About 73% of the frequencies align with language development and 27% align with language acquisition.

Table 4.12

*Frequency of Language Development and Language Acquisition Themes*

<table>
<thead>
<tr>
<th>Themes</th>
<th>Frequency, $n$</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language Development Themes</td>
<td>11</td>
<td>73.33</td>
</tr>
<tr>
<td>Language Acquisition Themes</td>
<td>4</td>
<td>26.67</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

Note. Overall frequency: $n=$15 total responses; percentage=100.00

**Instructional Methods Analysis (Question #9 of the Survey)**

Question nine of the survey (see Appendix B) asked: *What are key instructional methods that should be used to teach English to ELs and how effective are these methods at helping ELs reach proficiency in English?* The second cycle
coding process were grouped into the following five categories: *sheltered instruction*, *language modalities*, *multi-modal*, *socio-cognitive interactive process*, and *integration*. Using the neuroeducation lens, these new codes were placed into two categories: language development and language acquisition similar to previous sections. Table 4.13 outlines which of the new codes are in different categories.

Table 4.13

*Language Development versus Language Acquisition*

<table>
<thead>
<tr>
<th>Language Development</th>
<th>Language Acquisition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheltered Instruction</td>
<td>Multimodal</td>
</tr>
<tr>
<td>Language Modalities</td>
<td>Socio-cognitive Interactive Process</td>
</tr>
<tr>
<td></td>
<td>Integration</td>
</tr>
</tbody>
</table>

Table 4.14 shows the frequencies of comments under the two categories of language development and language acquisition. Using these frequencies, participants that received PD share beliefs that align with the literature on language acquisition particularly around instructional methods that should be used with ELs with 76% of the frequencies categorized under language acquisition. Only 24% of the frequencies align with the literature on language development.

Table 4.14

*Frequency of Language Development and Language Acquisition Themes*

<table>
<thead>
<tr>
<th>Themes</th>
<th>Frequency, <em>n</em></th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language Development Themes</td>
<td>6</td>
<td>24.00</td>
</tr>
<tr>
<td>Language Acquisition Themes</td>
<td>19</td>
<td>76.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>25</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

Note. Overall frequency: *n*=25 total responses; percentage=100.00
The second cycle coding process for the group that did not receive PD resulted in four main themes: Direct/explicit instruction, language modalities, multi-modal, and native language support. Using the neuroeducation lens, the themes were organized into two categories: language development and language acquisition. Table 4.15 shows how the four themes were organized.

Table 4.15

<table>
<thead>
<tr>
<th>Language Development</th>
<th>Language Acquisition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct/Explicit Instruction</td>
<td>Multi-Modal</td>
</tr>
<tr>
<td>Language Modalities</td>
<td>Native Language Support</td>
</tr>
</tbody>
</table>

Table 4.16 shows the frequencies of comments under the two categories. Participants that did not receive PD had beliefs that aligned more with the literature on language development similar to the group that received PD.

Table 4.16

<table>
<thead>
<tr>
<th>Themes</th>
<th>Frequency, n</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language Development Themes</td>
<td>5</td>
<td>25.00</td>
</tr>
<tr>
<td>Language Acquisition Themes</td>
<td>15</td>
<td>75.00</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Note. Overall frequency: $n=20$ total responses; percentage=100.00

As noted earlier, strategies alone do not determine development or acquisition but how these strategies are used will. Therefore, this next section will look at classroom practice to see how the strategies were used. Phase Three starts by
analyzing the connection between the beliefs of the participants that received PD on neuroeducation and the NSLLT and their actual classroom practice to see if there was a connection between beliefs and practice. Then, the researcher analyzed the beliefs and practice for the group that did not receive PD. Phase Four will triangulate the beliefs of the group that received PD, the beliefs of the group that did not receive PD, and their classroom practice.

**Phase Three Results**

Phase three involved four participants that received PD being observed and recorded once by an unknown observer with an observation tool (see Appendix E). This phase was designed to answer the third research question: *How do the beliefs of educators who received PD on the methods of language acquisition align with their beliefs about effective instructional methods and their instructional practice when observed a year later as measured by a survey and an observation tool?*

The purpose of this phase was to determine whether the participants that received PD held beliefs that aligned to instructional practices and if these practices aligned more with the literature on language development or language acquisition. The observation tool asked “yes” and “no” questions and so these answers were quantified to determine alignment of beliefs to practice. The beliefs of this group were determined by the survey results from phase one part two and then aligned to the “yes” and “no” data to determine alignment. The more “yes” responses indicated a majority alignment to the neuroeducation and NSLLT lens as well as to the literature on language acquisition because the tool used was aligned to the NSLLT and to acquisition practices.
Findings indicate that the beliefs of the educators that received PD on instructional methods aligned with the literature on language acquisition. Figure 4.7 provides a visual of this alignment. Also, using classroom observation tools, notes, and transcriptions for this group that received PD, there was an alignment to the literature on language acquisition.

Figure 4.7. Phase Three Visual, Beliefs Aligned to Classroom Practice

The next section will describe how the data collected by the classroom observations and transcriptions were analyzed to align beliefs to practice for the group that received PD.

**Classroom Practices – Group with Professional Development**

There were a total of four participants that received PD that participated in the study. To protect their identity, pseudonyms were used. They will be referred to as PD1, PD2, PD3, and PD4. The PD stands for professional development. There will be two data points used to determine whether these participants’ beliefs align to their classroom practice which addresses research question number three. The two data points are the classroom observation tool and the observer notes/transcription of the observations.

There were a total of ten questions on the observation tool that the observer used for all of the classroom observations. A copy of the actual tool can be found in
Appendix E. The questions were direct questions that required a yes or no answer from the observer.

Table 4.17 summarizes the key findings from the four participants that received PD. A “yes” answer indicates that the participant’s classroom practice for that specific question aligned to neuroeducation. A “no” answer indicates a misalignment to neuroeducation. A “y/n” answer indicates there was some indication of alignment to neuroeducation.

Table 4.17

*Observation Checklist Answers from Group with Professional Development*

<table>
<thead>
<tr>
<th>Observation Checklist Questions</th>
<th>PD1</th>
<th>PD2</th>
<th>PD3</th>
<th>PD4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is there evidence of Viconic Language Methods (VLMs)?</td>
<td>NO</td>
<td>Y/N</td>
<td>Y/N</td>
<td>NO</td>
</tr>
<tr>
<td>Can I see what the teacher is doing without any words being used to explain what is done?</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Can I see what the students are intended to do on a specific task without any words being used to explain the task?</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Are the learners participating in an event?</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>Are the learners resourcing materials for information gathering?</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Are there multiple varieties of resource materials for students to use as an agent within an event?</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Are the learning opportunities progressing developmentally?</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>Is the learning environment organized by space?</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Do the learners have individual strategy checklists to help them advocate for their own learning?</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Are learning opportunities organized by space?</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
</tr>
</tbody>
</table>

Note. PD=Professional Development
Table 4.18 below displays the frequency of the number of “yes” and “no” answers from all of the participants as well as “y/n” responses. A “y/n” response counted as half for each of the “yes” and “no” tallies. The tally of responses from the observer leads to the conclusion that for the observation tool, about 53% of the classroom practices observed aligned to the literature on language acquisition using the neuroeducation framework. This data was surprising to the researcher as these participants only received one three-hour PD session on neuroeducation and the NsLLT and three of them received a follow-up training a few months later in the same school year.

Table 4.18

<table>
<thead>
<tr>
<th>Codes</th>
<th>Frequency, n</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>21</td>
<td>52.50</td>
</tr>
<tr>
<td>NO</td>
<td>19</td>
<td>47.50</td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Note. Total Frequency n=40, percentage=100.00

The next data point that was used was the observer’s notes/transcriptions on each classroom observation. The observer noted that as a collective group that received PD there were still areas that needed growth toward a continual paradigm shift to a neuroeducation framework but that there was definitely potential for this growth to occur with the right training and PD. According to the observer, “these
educators are starting to use strategies that are supported by NvES\(^1\), but there is still a lot of room for growth.”

For PD1, the observer noted that the participant could start to use VLMs such as picture dictionaries for the words “provocative, dilemma, and ethical,” cartoons, or a “flowchart of various dilemmas to help develop their story.” This participant could also “start their lesson with an “I” story about an ethical dilemma with the entire class drawing about their thinking and what created a dilemma.” The observer noted that for PD1, students are very strong in their learning of pro-social behaviors. Other feedback for PD1 is that “perhaps allow students to write their story first then offer a suggested format for revisions so the basis is their story and the structure of the story is secondary.” The observer also asked if there was “an authentic way that the learners’ writing could be shared outside the classroom as in a school newspaper, editorial, or inviting guests in to hear the essays.”

There were elements of the actual transcription from this observation for PD1 that aligned to the neuroeducation framework where PD1 was starting with preoperational examples to get to concrete. PD1 asked students “or what are some consequences if you are lazy.” PD1 continues to state, “everyone should have chosen an ethical dilemma to write about and how you are thinking of three questions.” The participant encouraged students to use their thinking in writing about their ethical dilemma. Here, the students become the agents in their writing.

Similar to the feedback given to PD1, PD2 could also use more VLMs such as cartoons and flowcharts but this participant had learners’ work displayed, had

\(^1\) The NvES is an approach that is based on the theoretical constructs of ANM (NsLLT), (Arwood & Rostamizadeh, 2016)
evidence of event-based schedules, and evidence of event-based pictures so there was
evidence of alignment to a neuroeducation framework. This participant could also
have more individual student checklists to help students advocate for their own
learning. This participant could “add an agent or person thinking whenever possible
(on graph axis) to answer questions: Why did we choose 30 minutes versus 10
minutes, and what does this bar mean (all learners or only one?).” Feedback for PD2
on pro-social learning is that the students “are already engaged so turn-and-tell while
you listen and offer refinement would give all students the opportunity to answer
every time.” To connect learning through context, the observer recommended PD2
“bring in real-life examples of graphs in newspapers/articles, connect reading goals to
a purpose, and give learners an opportunity to disseminate their learning as in posting
goals or graphs and creating an event to celebrate.” To get students to share their
thinking, which is a critical strategy for language acquisition through the
neuroeducation lens, the observer recommended PD2 use “picture dictionaries for bar
graph, line graph, goal, axis, and title” as well as use “I stories at the beginning of the
lesson and refer back to it (i.e. On New Year’s Eve, I set a goal for myself to eat
something new each week. Draw and write what new thing you want to try. Share
with the group. Now we are going to set a goal for the amount of reading you think
you could read.”

PD2 also used preoperational examples to get to concrete and then later to
formal levels of language by stating “we’ve been talking about goals, goals in our
personal life and goals in our reading life.” PD2 continues and asks students “how
many minutes do you think you read if you were to give an estimate since you do not
have your reading log, estimate or guess?” Starting with preoperational questions can help students start to make connections to overlap the concepts they are learning, which is in line with a neuroeducation framework.

PD3 also had some indication of VLMs used such as learners’ work displayed and event-based pictures, which is an indication there is progress and some hint of alignment to a neuroeducation framework. PD3 also included individual strategy checklists to help students advocate for their own learning such as conferencing binders in book boxes (class list of names with pictures, conference chores, power words, and reading strategies). Classroom lists were also posted and verbal cartooning was used. To continue to make a paradigm shift toward more alignment to the language acquisition literature through neuroeducation lens, the feedback for PD3 is “since most learners use visual metacognition, shift “sound” to “shape” and look at the shape my mouth makes when I say this idea.” The observer indicated that pro-social learning “is already very strong in this room.” PD3 could also “use turn and tell as a method for all learners to share their ideas (i.e. Is it ok if your car is different? Yes because we have different ideas in our brain).” To continue to connect learning through context, “in drawing, add agents whenever possible connecting to one another.” “Give a purpose for reading like an event to share strategies outside of the classroom (big picture).” Also, “use a picture dictionary for super reader strategies that students draw, shift identifying sounds in car to identifying shapes with bubbling and show how the shape of the mouth changes with the shape of the idea.”

PD3 was in a model where there were two teachers. Similar to previous participants, PD3 also used preoperational examples to get to a concrete level and then
concrete to formal. PD3 “starts by making connections with students and asks a learner about their recent trip to Mexico and asking who the student saw while the student was there.” PD3 also asks a student “can you draw that on the palm of your hand.”

Lastly, for PD4, there were not as many touch points of alignment between classroom practice and the neuroeducation framework as this participant received the least number of “yes” responses on the observation tool. However, there were glimpses of potential and effort toward aligning the practice to the framework. To align more to the framework, PD4 could incorporate more VLMs that are created by the learner or the student and add people doing something or thinking in connection with others on event-based pictures. PD4 could also use the learners as examples participating in an event such as scientists investigating questions, authors writing narrative, expository, or persuasive pieces, mathematicians solving problems, and historians researching social dilemmas or social complexes. Learners could also use a variety of materials for information gathering as well as for students to use as an agent within an event. The learning opportunities for students also need to progress developmentally as “no connection to students was made for the content although the purpose of preparing for the ELPA was made several times.” There were many posters made with the class that are displayed so learners can refer back to them. PD4 could incorporate more individual strategy checklists to help students advocate for themselves. Also, “learners could present information or record it on a device to start at preoperational level. For example, tell about a favorite dish your parents make.” “Use document camera for students to show their thinking.” The “give one, get one”
activity was done well that helped students show their thinking. To continue to connect the learning through context, “relate the task back to an authentic scenario like “when we hear stories, we remember them by thinking who, what, when, where, why, how.” The observer also noted that “there were many graphic organizers in place and they could be more concrete by adding people (agents thinking) as well as “cartooning directions about the task.”

PD4 talked about what the learners were supposed to be thinking about when they were listening to a recording. PD4 taught students about metacognition and encouraged students to write about what they heard, which was not framed for them in advance. Instead, students were allowed to write about their thinking while they were listening to the recording.

**Phase Four Results**

Similar to the previous phase, phase four involved the four participants that did not receive PD being observed and recorded once by an unknown observer. The observer used the same observation tool with all four participants. This phase was designed to answer the fourth research question: *How do these educators show the same or different sets of beliefs about effective instructional methods that are aligned to their practice when compared to a group of educators who have not received the same PD as measured by a survey and an observation tool?*

This purpose of this phase was to connect the beliefs of the group that received PD, the beliefs of the group that did not receive PD, and align those beliefs to their classroom practice. The result of this alignment was that the beliefs of these two groups on best instructional methods aligned to the literature on language acquisition.
After reviewing observation tools and observation notes/transcriptions, there was alignment between beliefs and classroom practice to the literature on language acquisition for the group that received PD. However, for the group that did not receive PD, their beliefs on best instructional methods did not align with their classroom practice. Their classroom practice aligned more to the literature on language development. Figure 4.8 provides a visual of this triangulation.

![Figure 4.8. Phase Four Visual, Beliefs Aligned to Classroom Practice](image)

**Classroom Practices – Group Without Professional Development**

There were a total of four participants that did not receive PD on neuroeducation and the NsLLT that participated in the study. In order to protect their identity, pseudonyms were used. They will be referred to as NPD1, NPD2, NPD3, and NPD4. The NPD stands for No Professional Development. As in the previous analysis, there will be two data points used to determine whether these participants’ beliefs align to their classroom practice which addresses research question number
three. The two data points are the classroom observation tool and the observer notes/transcription of the observations.

Table 4.19 summarizes the key findings from all of the four participants that did not receive PD as done in the previous section. The “yes” and “no” responses indicate an alignment or not to the neuroeducation framework.

Table 4.19

Observation Checklist Answers from Group without Professional Development

<table>
<thead>
<tr>
<th>Observation Checklist Questions</th>
<th>NPD 1</th>
<th>NPD 2</th>
<th>NPD 3</th>
<th>NPD 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is there evidence of Viconic Language Methods (VLMs)?</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Can I see what the teacher is doing without any words being used to explain what is done?</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>Can I see what the students are intended to do on a specific task without any words being used to explain the task?</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Are the learners participating in an event?</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>Are the learners resourcing materials for information gathering?</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Are there multiple varieties of resource materials for students to use as an agent within an event?</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Are the learning opportunities progressing developmentally?</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>Is the learning environment organized by space?</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Do the learners have individual strategy checklists to help them advocate for their own learning?</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Are learning opportunities organized by space?</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
</tr>
</tbody>
</table>

Note. NPD=No Professional Development

Table 4.20 below displays the frequency of the number of “yes” and “no” answers from all of the participants. The tally of responses from the observer leads to the conclusion that for the observation tool, only about 30% of the classroom practices
observed aligned to the literature on language acquisition using the neuroeducation framework and 70% did not. This data was not a surprise to the researcher as this group received no PD on neuroeducation and the NsLLT and two of the participants were new to the district. However, this data does correspond with the national emphasis on development or surface structures for SLA.

Table 4.20

*Frequency of YES and NO Responses for Group without Professional Development*

<table>
<thead>
<tr>
<th>Codes</th>
<th>Frequency, n</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>12</td>
<td>30.00</td>
</tr>
<tr>
<td>NO</td>
<td>28</td>
<td>70.00</td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Note. Total Frequency $n=40$, percentage=100.00

The next data point that was used was the observer’s notes/transcriptions on each classroom observation for the participants that did not receive the PD. It is evident after reviewing the comments and notes from these observations that PD aligned to a common theoretical framework leads to a connection to classroom practice. Similar to the previous group, the observer noted there was still more room to grow when it comes to incorporating elements of a neuroeducation framework into classroom practice for this group of educators.

NPD1 had some learners’ work displayed but there were still “many formal pictures being used.” This participant could use more VLMs like cartoons and flowcharts. Learners could also participate in an event. The learners were resourcing materials for information gathering but on a limited basis. This participant could use a variety of resource materials for students to use as an agent within an event. The
learning also needs to progress developmentally from preoperational learning opportunities to multiple concrete examples and then from concrete examples to formal understanding of concepts that can be represented with the learners’ own natural language. According to the observer, NPD1 “started at formal level with sentences removed from the learner.” Also, “working with partners was encouraged but there was minimal sharing that occurred” during the lesson that was observed. The participant could also add individual strategy checklists to help students advocate for themselves and have learning opportunities organized by space. To continue growing and working towards a paradigm shift to alignment to a neuroeducation framework, the observer recommends NPD1 “continue asking learners to explain why they chose an answer and refer to what pictures learners see in their head.” Also, “continue responding to any contributions from students, continue explaining context of articles (add pictures), add an I story to drop learning down to preoperational level, add picture dictionaries in place of written definitions, and add people doing things in relationship to each other.”

There were some aspects of the lesson that connected to the neuroeducation framework in that NPD1 asked students to “take what you know in your brain from what your mom did at her old job” which gets students to explain some of their thinking. This participant also used gestures by writing in the air to indicate what to do. NPD1 also encouraged students to “work in partners and write in your own words” which develops the learner as the agent in their own learning. The observer recommended NPD1 “turn the idioms into cartoons, change spelling to shape, use
picture dictionaries for homonyms, and add how do you know or why do you think questions.”

NPD2 could use many of the same strategies as NPD1 such as VLMs, having learners participate in an event, resourcing materials for information gathering, using a variety of resource materials for students to use an agent within an event, and having units that progress developmentally from preoperational learning opportunities to concrete examples and then from concrete to formal understanding of concepts. To progress toward more alignment to neuroeducation, NPD2 could “have learners trace the shape and draw the idea, encourage learners to share their thinking with others, group their thinking, and translate picture cards into event-based pictures with people. Also, “refer to the shape of the idea versus work and “show learners how the shape of the mouth looks when I say this idea.”

NPD2 was in a model where students were given four picture cards to choose from as part of an assessment. The learner is asked to choose the picture that matches the word. The participant asked students to “find the picture that matches this word” and “what letter does that word start with.” NPD2 continues to ask students “what is this picture, what sound does it stat with, and does that match your word.” Again, this was an assessment but based on this transcription and observer’s notes, the assessment aligns more to the literature on language development as the parts of the language are being assessed rather than the function of the whole. Also, the assessment relied on input equaling output meaning the teacher orally presented information and the students were to give back the information orally.
Similar to the first two participants, NPD3 could use the same strategies mentioned above. However, NPD3 had learners participate in an event as scientists investigating questions. NPD3 could have learners resourcing materials for information gathering as well as providing multiple varieties of resource materials for students to use as an agent within an event. NPD3 had many more “yes” responses on the observation tool than any of the other four participants. The learning progressed from preoperational to multiple concrete examples where “learners write what they know, share with others, and share with whole group.” However, to move from concrete to formal language, “learners used sentence frames rather than their own natural language.” Learners also had “color-coded journals that walked them through the steps of solving a problem or creating a graph.” This is an indication that learners have individual strategy checklists to help them advocate for their own learning. The observer recommended that NPD3 “start with an I story to set up the purpose for asking these questions and start at preoperational level.” The observer noted that students learning to be pro-social were “well-established with this educator” and that “the educator clearly has strong relationships with the learners.” To connect learning through context, the observer recommended, “adding a person thinking when drawing ideas.” To get students to learn to think, “cartooning the steps to an experiment and use picture dictionaries to show thinking about the terminology.”

NPD3 shows signs of alignment to the literature of language acquisition through the neuroeducation framework by asking learners to “show your thinking before sharing with your neighbor.” NPD3 reads the ideas of the learners and asks
other learners to share their thinking. Students had the freedom to share their thinking in a safe environment.

The final participant, NPD4, is new to the district and therefore did not have much background on the work we were doing as far as engaging in a theoretical shift. Similar to many of the participants that did not receive PD on neuroeducation and the NsLLT, NPD4 could use many of the same strategies mentioned in the previous sections. Suggestions towards a paradigm shift to neuroeducation is that “learners can draw their thinking so they can use their own language versus testing right or wrong answers.” The observer also recommended NPD4 “use turn and tell to engage all learners in sharing their thinking and add a learner (agent/person) thinking when drawing ideas.” The observer continues by recommending NPD4 “cartoon steps to solve an equation and ask more how do you know questions.”

Summary

This chapter presented the findings relative to the purposes of the study as well as the research questions designed for this study. This Chapter presented findings for the first part of the study, which was an analysis of the pedagogical shifts in the context of ANM. Next, this Chapter presented findings for the second part of the study, which was the analysis of the impact of beliefs on classroom practice for the group that received PD and the group that did not receive PD.

Overall, the three pedagogical shifts did not align to ANM initially. However, adding literature from cognitive psychology, language function, and neuroscience allowed for the alignment between the shifts and ANM through the nexus, the NsLLT. Additionally, there was connection of beliefs around language acquisition to
classroom practice for the group that received PD but a disconnect between beliefs and practice for the group that did not receive PD. These findings indicate that PD can be impactful if aligned to a common theoretical framework on how language is acquired. The next chapter will offer some discussion in how to use the results of this study to impact change and shifts in the field of language acquisition, to include second language acquisition.
Chapter Five

Discussion

The purpose of this qualitative study was twofold: (1) To determine if the Arwood Neuroeducation Model (ANM) supports the pedagogical shifts recommended by Heritage, Walqui, and Linquanti (2015); and (2) If those district educators with and without a professional background in both the pedagogical shifts and in educating ELs based on the ANM show beliefs about language development and/or language acquisition that are aligned with their classroom practices. Chapter Four shared the results of this study. The purpose of this chapter is to discuss and interpret the results of the research questions posed for this study.

Summary and Implications of Findings

Analysis of Arwood’s Neuroeducation Model and the Pedagogical Shifts

The first purpose of the study was to use an existing theoretical model based on neuroeducation to support a shift in educational practices for ELs. There were three specific areas for shifting that were recommended by Heritage, Walqui, and Linquanti (2015). The main goal of this part of the study was to establish that the call for a paradigm shift in the context of SLA could be addressed theoretically using an existing neuroeducation model, specifically ANM.

Overall, the implication of the results outlined in Chapter Four was that each of the pedagogical shifts recommended by Heritage, Walqui, and Linquanti (2015)
provided a start and provided a basis for defining how language is acquired. But, the
literature within language function (pragmatics, semantics, and semiotics) as well as
from neuroscience suggests that these initial shifts necessitate a boost toward
understanding language as a set of socio-cognitive (Anton & DiCamilla, 1998;
Arwood, 2011; Atkinson, Churchill, Nishino, & Okada, 2007; Bühler, 1990; Halliday,
1973) as well as neurobiological processes (Arwood, 1983, 2011; Damasio &
Geschwind, 1984; Lenneberg, 1969; Poeppel et al., 2012; Pulvermüller, 2013a). In
other words, there was literature from ANM that may be used to enhance the shifts.

The researcher discovered that a vast range of literature surrounding
neuroscience might be used to support the shifts as well as to enhance the shifts.
Specifically, the researcher learned that language function includes multiple regions of
the brain as a result of neuro-semantic circuits and networks and that there is no one
place for words or other parts of language (Endrass, Mohr, & Pulvermüller, 2004;
Pulvermüller, 2016). There is also literature around neuroplasticity (Li, Legault, &
Litcofsky, 2016; Mundkur, 2005; Tu, Wang, Abutalebi, Jiang, Pan, Li, Gao, Yang,
Liang, Lu, Huang, 2015) and literature around the brain rewiring around the neural
structures that do not provide strong feedback allowing for integration and inhibition
of new sensory information to take place (Damasio & Geschwind, 1984; Lenneberg,
and the process of language acquisition being neurobiological in nature (Arwood,
1983, 2011; Damasio & Geschwind, 1984; Lenneberg, 1969; Poeppel et al., 2012;
Pulvermüller, 2013a) that may be added to the shifts to fill in the gaps. Other tenets of
ANM that may be used to enhance the shifts is through the literature on language
function and the NsLLT and the concept of agency and an outside agent naming concepts. The underlying tenets of NsLLT rests on this view that learning is a dynamic process between the language user, meaningful sensory input, and the outside agent naming the input (Arwood, 1983; 2011) and in order to facilitate this dynamic process, learners need to see themselves as “agents” of their own learning. Additionally, language is more than just words and structures and that analyzing only the structures of the language does not provide a holistic view of what students know and understand (Arwood, 1983; Greene, 1972; Searle, 1969). This finding provides evidence that in the context of language development and language acquisition as defined in Chapter Two, there is a difference between the two terms and that the literature from the three disciplines underlying ANM, cognitive psychology, neuroscience, and language function, shows that language acquisition and language development are not the same.

Another finding displayed in Figure 4.1 showed how contemporary theories and approaches of SLA fit within the three disciplines of ANM and there was heavy concentration of SLA theories in cognitive psychology. Adding the fields of neuroscience and language function may provide a more comprehensive and balanced perspective of the learning and acquisition process for SLA. As mentioned previously, studies of the mind or cognitive psychology, have already made its way into the field of SLA as well as the function of language. What is missing that will balance the perspective is the addition of neuroscience as this field of science started to make its way into contemporary theories of SLA with theories such as
neurofunctional theories (Trumbull & Farr, 2005) and neurolinguistics (Atkinson, 2011).

At the center of ANM is the NsLLT, the theory developed to unite all three fields of the model. Another implication that emerged from Part One of this study is that the NsLLT is a theory that may be used to explain the process of SLA. Although it is debatable whether one theory or multiple theories should be used to describe SLA, the researcher posits that the NsLLT should be used to describe the process of first and second language acquisition as it encompasses many parts of the acquisition process and pulls from multiple fields from many different angles as reflected in Figure 4.4. Figure 4.4 shows that adding the lens of ANM and NsLLT completes the ANM diagram therefore adding to the field of SLA heavily dominated by cognitivism. Additionally, if classrooms focused more on the acquisition of language rather than the development of language, students will be able to use language to understand ideas that are physically distant from the source, increase meaning of any subject, increase connections between literacy processes, use ideas in multiple places for multiple purposes, and use language more efficiently without redundancy.

Analysis of Educators’ Beliefs and Classroom Practice

Part Two of the study was designed to apply the theoretical model used in part one to investigate educators’ beliefs about how ELs acquire language and to determine if those beliefs translated into classroom practice following PD on ANM. Based on the results of part two of the study, there was a connection between the beliefs of the participants that received PD on neuroeducation and the NsLLT and their classroom practice. Their collective survey results indicated an alignment to the literature on
language acquisition. The frequency of yes answers on the observation tool also indicated an alignment to the literature on language acquisition, with the neuroeducation lens. Although the observer identified areas for growth for this group of participants, the observer noted these participants were on the verge of continuing to grow the practice of incorporating more strategies that aligned with the neuroeducation framework with the right PD. In contrast, the beliefs of the group that did not receive PD did not align to their classroom practice. Their beliefs aligned to the literature on language acquisition but their practice aligned to the literature on language development. For example, for this group that did not receive PD, the two codes that were generated from the survey were multimodal strategies and native language supports which are strategies that align well to the literature on language acquisition. However, their classroom observation tool did not indicate the use of multimodal strategies or Viconic Language Methods (VLMs). This group also had beliefs that aligned to language development such as direct/explicit language instruction and repetition in oral practice.

The implication of these results is that PD makes a difference for educators of language as language teachers implement strategies for teaching language based on their experience learning a language. Another implication is that it is a challenge to extract the personal and professional beliefs of educators responsible for delivering the language instruction for students. Then, a final implication is how to align those beliefs with a common theoretical framework to influence classroom practice.

The question that remains as a result of this part of the study is how districts can consistently influence the personal and professional beliefs of language educators
so their beliefs align to a common framework. When PD is aligned to a common framework, beliefs are aligned to classroom practice. When PD is not aligned to a common framework or if no PD is provided that is aligned to a common framework, beliefs do not align to classroom practice. Therefore, a paradigm shift is needed and in order to help educators make that paradigm shift they need more than just a book and PD about the shifts. What is needed is ongoing PD from key experts in the field of language acquisition so there is consistent monitoring and assistance in applying theory to classroom practice. There are several PD frameworks that are being used and implemented in the field of SLA. However, what is needed is for these frameworks to align to the literature on language acquisition and then for the key experts to consistently assist educators in the implementation of these theories, such as the NsLLT.

Another implication of Part Two of the study is the transparency of how inconsistent the beliefs and practices are that exist in a single school district. It is evident that there are some educators whose beliefs and practices align to the literature on language acquisition and there are those whose beliefs and practices align to the literature on language development. This poses issues around equity (giving students what they need to achieve, contrast to equality) in that some ELs are being taught by educators that have aligned beliefs and practices to development and some are being taught by educators that have aligned beliefs and practices to acquisition in the same district. ELs do not have a choice in the different program models designed to meet their culturally and linguistically diverse needs nor do they have a choice in their teachers that may have different beliefs and practices of how language is acquired.
Recommendations for Practice

Given the results of both Part One and Part Two of this study, the researcher has several recommendations for practice that aligns with the requirements of two instrumental court cases. The first case is the 1974 Supreme Court case *Lau v. Nichols*, one of the most important court decisions and rulings regarding the education of ELs, which states that requires districts to implement instructional programs that help ELs overcome language barriers that impede equal participation by its students in its instructional programs and affirms that no state or district shall deny educational opportunities to an individual on account of race, color, sex, or national origin. An example of a language barrier could be educators’ personal beliefs if those beliefs do not match with the literature on how children learn language. Another important court case that impacts programs for ELs is the 1981 federal case, *Castañeda vs. Pickard*, which establishes that: (1) The instructional program designed for ELs must be based on sound educational theory; (2) The program must be implemented effectively with resources to include adequate staffing, instructional materials, and professional development; and (3) After a period of time, the program must be evaluated and proven effective in helping students overcome language barriers (Alexander & Alexander, 2005). A major outcome of these cases is that states and school districts are held accountable for addressing the needs of ELs as required by the Equal Educational Opportunities Act of 1974 (EEOA). The recommendations will be organized using the three-pronged test outlined in the *Castañeda vs. Pickard* case referenced above.
Sound Educational Theory

As was mentioned in previous sections and chapters, the field of SLA is not governed by a single educational theory and in fact, currently uses multiple theories to explain the process of language acquisition. This poses problems for districts in determining which theories are “sound” and which ones are not. The Castañeda vs. Pickard case does not define the term “sound” so this is left to interpretation and therefore, leaves room for subjective, rather than objective, practices. For example, one teacher may believe that “sound” theory is that language is acquired through the structures of language. Another teacher, on the hand, may believe that “sound” theory is theory based on the acquisition of language and not development of language. It is subjective and not necessarily defined in law.

Another problem is that the field of SLA “has witnessed a proliferation of approaches (at a philosophical level) and methods (at a procedural level), and although this range of choices can be useful, it also carries several challenges for ESL teachers” (Valdés, Kibler, & Walqui, 2014, p. 20). One such challenge is that the approaches, theories and methods although useful, “offer distinct views of what language is, how language is best learned, and the most useful pedagogy that will facilitate this learning” and some theories may even contradict each other (Valdés, Kibler, & Walqui, 2014, p. 22). An example of this contradiction is best described below by Valdés, Kibler, and Walqui (2014).

Formal theories that emphasize language as a grammatical system do not recognize the contextually bound nature of language emphasized by functional theories or the dialogical and participatory nature of language proposed by
sociocultural theories. When teachers describe themselves as eclectic, they may not be aware of the contradictions among the approaches they are using. In other cases, they may be aware of these contradictions but feel compelled to use them because of competing outside demands, such as a grammatically oriented English language proficiency exams and functionally oriented content-area assessments. The application of a collage of practices derived from inconsistent theories cannot be assumed to render good results for students, in the same way in which a mix of treatments from different medical perspectives likely will not enhance a patient’s opportunities of getting well. (p. 22)

This contradiction of competing theories has caused key researchers in the field of SLA to investigate commonalities between theories and to clearly define the critical elements of a theory. VanPatten and Williams (2015) state “the only way SLA can advance as a research field is if it is theory driven” (p. 1). For the field of SLA, “we will want a theory that acts like a theory should. We will want it to account for observable phenomena, to make predictions, and to unify the generalizations we make as part of the theory. In other words, we want a single theory to bring all of the observed phenomena under one umbrella” (VanPatten & Williams, 2015, p. 4). A theory should also be distinguished from a model. A model “describes processes or sets of processes of phenomenon and may show how different components of a phenomenon interact” (VanPatten & Williams, 2015, p. 4) but a model does not need to explain the why but describes the how. Although in principle researchers should clearly distinguish between these terms “in practice many of us in SLA do not do so”
The researcher recommends using the summary of language acquisition themes outlined in Table 5.1 below to guide the development of a theoretical framework using the neuroeducation and NsLLT lens. The purpose of this table is to show how ANM and the corresponding theory, NsLLT, may be considered “sound educational theory” to meet the requirements of the law.

### Table 5.1

**Summary of Language Acquisition Themes and Classroom Practice**

<table>
<thead>
<tr>
<th>Language Acquisition Theme</th>
<th>Lens Supporting Language Acquisition Theme</th>
<th>Manifestation in Classroom Practice</th>
</tr>
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<tbody>
<tr>
<td>First and second language acquisition is similar</td>
<td><strong>Neuroscience</strong>: Learners use the whole brain and multiple regions of the brain to learn a language, including a second language (Vigneau et al., 2006). Language acquisition is a neurobiological process where the structures of the brain are acquired by first acquiring language and then using the language to represent concepts. This happens regardless of the language that is being acquired (Lenneberg, 1969; Pulvermüller, 1999; Pulvermüller, 2003; Pulvermüller, 2012).</td>
<td>• Retagging of language in the second language.  • Dual language approach of bridging both languages in context.  • Allowing students to “translanguage” or use both languages simultaneously.</td>
</tr>
<tr>
<td>Social process</td>
<td><strong>Social Constructivism Language Theory</strong>: Learners acquire concepts through social interaction that is meaningful to them (Arwood, 1983; Carroll, 1964; Dewey, 1910; Halliday, 1977; Peirce, 1878; Sapir, 1949; Searle, 1970; Tomasello, 2004; Vygotsky, 1962).  <strong>Sociocultural Theory</strong>: Language acquisition is a social action where language is used to perform, indicate, request, promise, ask for information, threaten, and persuade (Bruner, 1972; Tomasello, 2001). In order to understand the individual learner “it is necessary to understand the social relations in which the individual exists” (Wertsch, 1991, p. 26).  <strong>Social Interaction Theory</strong>: Learning involves</td>
<td>• Grouping strategies are varied and allow for socialization to occur.  • Peer interactions, peer talk, think-pair-share activities.  • Whole class forming oral playful narratives (Lantolf, 2000).  • Overlapping “talkstory” activities (Lantolf, 2000).  • Simulations of</td>
</tr>
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</table>
students playing and taking an active role in their learning so they are able to independently problem solve and it is through these social interactions that are the most beneficial to the intellectual development of the student learner with expert assistance (Vygotsky, 1978, 1986).

**Environment**

<table>
<thead>
<tr>
<th>Sociocultural Theory: Bruner posited that human beings come into a world that is already structured culturally and linguistically, and their long period of immaturity is designed precisely for them to acquire the particular cultural and linguistic conventions into which they are born (Tomasello, 2001). For Bruner, the learner’s environment has a lot to do with the process of acquiring a language and opposed Chomsky’s LAD.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching culturally and linguistically diverse curriculum students can connect to.</td>
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<tr>
<td>Building positive relationships with students.</td>
</tr>
<tr>
<td>Creating a safe but challenging learning environment.</td>
</tr>
</tbody>
</table>

**Scaffolding**

| Language Theory: Learners use concepts they have acquired to learn new concepts. They do this by “scaffolding” or weaving in the old concepts that have a semantic relationship with the new concepts (Carroll, 1964; Halliday, 1977; Vygotsky, 1962). |
| Sociocultural Theory: According to Bruner, we build concepts by “scaffolding” in a spiraling type of curriculum where concepts were taught in multiple ways or in different ways (Tomasello, 2001). |
| The NsLLT is a dynamic process that “scaffolds” the overlapping of concepts. The learner receives meaningful sensory input and then uses this input to create multiple overlapping of the patterns to form concepts. Through the layering of concepts, the learner is able to acquire language and then uses this language to name the concepts (Arwood, 1983, 2011). |
| Visual flowcharts. |
| Drawing before writing. |
| Multiple points of access. |
| Layering meaning and activities so they start with preoperational but move to formal levels of learning. |

**Multi-modal (multiple points of access and not just multiple inputs and outputs)**

<table>
<thead>
<tr>
<th>Neuroscience: Language is acquired neurobiologically by multiple regions of the whole brain (Pulvermüller, 2005; Vigneau et al, 2006). The brain will create multiple and efficient pathways through the process of inhibition and integration of meaningful sensory input and will rewire around neural structures that do not provide strong feedback (Baars &amp; Gage, 2010). Therefore, multi-modal methods allow the</th>
</tr>
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<tbody>
<tr>
<td>Using visuals to assign meaning.</td>
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<tr>
<td>Viconic Language Methods (VLMs).</td>
</tr>
<tr>
<td>Games, movement, realia, manipulatives, story telling, songs, poems, hands on</td>
</tr>
</tbody>
</table>
Brain to make many neural networks therefore strengthening the acquisition of concepts. Providing multiple points of access for learning is critical to the process of language acquisition. It is important to note that multi-modal methods need to be used in context with other aspects of acquisition in order to be useful.

| Senses and Meaning | Semantic Language Acquisition: Meaning must be attached otherwise, language is not acquired. Learners use concepts they acquire by forming a semantic relationship between what they know and what they do not know (Carroll, 1964; Halliday, 1977; Vygotsky, 1962). More ref NsLLT: The brain receives messages via meaningful sensory input and processes that input by identifying patterns to form concepts and then language names the concept (Arwood, 2011). | • Providing contextual experiences.  
• Connecting concepts to specific words and refining the concept and word relationship through time.  
• Providing multiple points of access. |
| Time | Language Function Acquisition. Children acquire language by about seven or eight years of age (Arwood, 2011). However, they continue to learn new concepts and layer concepts therefore increasing the depth of their language (Arwood, 2011). Language acquisition through a neuroeducation lens affirms that the process of acquiring concepts occurs throughout a person’s life and that acquisition should not be evaluated on the products of the language at a given time or stage of the process. | • Assessing students using authentic assessments.  
• Providing students enough time to demonstrate the acquisition of concepts by individual versus whole class assessment practices. |
| NsLLT | Language Based on Semantics and pragmatics. Learners use concepts they acquire by forming a semantic relationship between what they know and what they do not know (Carroll, 1964; Halliday, 1977; Vygotsky, 1962). Also, the structure or parts of a language represents acquisition of a whole idea, therefore, only with acquisition of a whole concept can the parts be revealed or identified (Arwood, 2011, Carroll, 1964; Dewey, 1910; Halliday, 1977; Sapir, 1949; Vygotsky, 1962). Neuroscience: Learners use the whole brain and multiple regions of the brain to learn a language, including a second language (Vigneau et al., 2006). Language acquisition is a neurobiological | • Providing students the opportunity to interact with their own personal histories.  
• Using VLMs consistently in all lessons.  
• Visual concept dictionaries.  
• Writing by showing the whole word rather than parts of the word.  
• Reading by taking |
process where the structures of the brain are acquired by first acquiring language and then using the language to represent concepts. This happens regardless of the language that is being acquired (Lenneberg, 1969; Pulvermüller, 1999; Pulvermüller, 2003; Pulvermüller, 2012).

**Conceptual Stages of Language:** In order to understand the levels of conceptualization within the NsLLT, there needs to be clear understanding of Piaget’s four stages of cognitive development that scaffold meaning to deepen concepts: sensorimotor, preoperational, concrete, and formal (Arwood, 2011; Carroll, 1964; Piaget, 1959).

**Pragmaticism:** Pragmaticism methodology looked at the learner as a whole and not just the products of the child or the learner (Arwood, 1984; Peirce, 1878).

**Sociocultural Theory:** Sociocultural theory posits that agency matters especially in language classrooms. Learners “bring to interactions their own personal histories replete with values, assumptions, beliefs, rights, duties, and obligations” (Lantolf, 2000, p. 46). In other words, “learners actively transform their world and do not merely conform to it” (Lantolf, 2000, p. 46).

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### Effective Implementation with Adequate Resources

The same three-pronged test used in the previous section will be used for this section. The second criteria of the three-pronged test outlined by Castañeda vs. Pickard case is that the implementation of program models serving ELs need to be supported with adequate resources in staffing, instructional materials, and PD. Another recommendation is for educator professionals responsible for language programs to be diligent in providing ongoing PD to teachers as the EL population becomes more and more diverse. Teachers of ELs have reported challenges in

<table>
<thead>
<tr>
<th>The whole idea and not parts of the idea.</th>
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<tbody>
<tr>
<td>• Drawing before writing.</td>
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<tr>
<td>• Hand over hand techniques.</td>
</tr>
<tr>
<td>• Layering classroom learning events to aide with concept acquisition.</td>
</tr>
<tr>
<td>• Integrate language and content learning to strengthen neural networks.</td>
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</table>
meeting the needs of ELs due to the lack of tools, little PD or training on how to teach ELs, and the inadequacy of the PD needed to improve teacher skills (Trueba, Jacobs & Kirton, 1990). As established in Chapter Two, beliefs of educators can have an impact on classroom practice with the right PD. The challenge is influencing their beliefs and aligning the beliefs to a common theoretical foundation as evidenced by the data in Chapter Four that highlighted how educators in the same district had beliefs that aligned to the literature on language acquisition and some that aligned to the literature on language development.

Theory should drive practice but there also needs to be the right PD and supports in place for facilitating this connection between theory and practice. Arwood and Robb (2008) outlined a theory to practice model where the expert met regularly with the practitioner while the practitioner implemented the PD strategies to provide feedback that aligned to neuroeducation and the NsLLT. This model proved to be effective as there was growth in student achievement over a four-year period. The study by Arwood and Robb (2008) also highlights a possible time frame for the implementation of PD, four years, to ensure the PD is fully implemented and sustainable. The research within this study recommends that for any PD implementation, “the advancement of expertise to work with ELs in ambitious ways requires an investment in professional development different from the isolated, piecemeal workshops many teachers have experienced. Deep, transformative knowledge can only be brought about through sustained, focused professional development” (Valdés, Kibler, & Walqui, 2014, p. 24).
**Evaluation of Program and Proven Effectiveness**

The final test of Castañeda vs. Pickard case is that after a period of time, the program must be evaluated and proven effective in helping ELs overcome language barriers. In order to accomplish this task, a final recommendation is for key stakeholders to use the common theoretical framework developed in the first section to design an instructional model for helping ELs acquire language that aligns to the available literature. Using the ANM moves the field away from just using cognitivism and Theory of Mind to also using the literature about how the brain learns (neuroscience) triangulated with the literature about the neuro-semantics of language (pragmatics, deep semantics, and semiotics). Then, provide PD for educators to implement this instructional model and create a plan for evaluating the impact of this model on student achievement. The evaluation period should last long enough to truly analyze impact on student achievement. Cohort data for multiple years should be used rather than single year data points.

The goal with neuroeducation and the NsLLT becomes concept acquisition or to increase thinking rather than teaching the developmental products of acquisition (Arwood, 1983, 2011; Robb, 2008, 2016). Any other model that works towards concept acquisition will align to neuroeducation and the NsLLT. Learning (NsLLT) occurs at four levels and we want more than the patterns or imitated skills at level two, we want the conceptualization and language function to represent the thinking (Arwood, 2011; Bruner, 1975; Carroll, 1964; Halliday, 1977; Peirce, 1878; Vygotsky, 1962), which neuroscientists also confirm that the process of concept acquisition occurs at the neurobiological level (Lenneberg, 1969; Pulvermüller, 2013a).
Although there is empirical evidence that proves dual language programs are the most effective model for ELs (Goldenberg, 2008, 2013; Greenberg, Vazquez, & Holmgren, 2019; Steele et al., 2017; Thomas & Collier, 1997, 2003, 2004, 2014; Umansky, Valentino, & Reardon, 2015) the question language experts should ask is why these programs are the most effective for ELs. The answer may lie in the differences between language development and language acquisition outlined in Chapter Two. It may also be due to the expansive growth in concepts when content is embedded with language as evidenced by studies coming out of the field of neuroscience. Additionally, another program model that is gaining traction nationwide as an effective model for ELs is collaborative co-teaching (Greenberg, Vazquez, & Holmgren, 2019; Honigsfeld & Dove, 2010, 2012, 2016, 2019) as this model provides linguistically rich opportunities for students to integrate content and language in order to develop academic expertise across content areas throughout the school day (Baecher & Bell, 2011; Honigsfeld & Dove, 2010, 2012, 2016, 2019; Vangrieken et al., 2015) similar to the goals of a dual language program. This concept of integrating language and content also aligns with the shift proposed by Heritage, Walqui, and Linquanti (2015).

This building of neural networks allows for the process of inhibition and integration of new information therefore increasing and strengthening the neural networks of concepts (Demasio & Geschwind, 1984; Lenneberg, 1969; Poeppel, Emmorey, Hickock, & Pylkkanen, 2012; Pulvermüller, 2003, 2012). Dual language programs do not focus solely on the structures of the language. There is intentional effort to weave concepts of content with language. If a dual language program is not
available for ELs, a collaborative co-teaching or integrated model works somewhat in the same way by integrating language with content but just with one language. The key is ensuring the integration of language is focused on the function of language rather than the structure of the language.

The next section will highlight the various future studies that would strengthen the claim that using the literature on language acquisition rather than language development will improve outcomes for ELs.

**Future Studies**

**The Most Effective Accountability Measure**

Through federally mandated procedures, ELs are identified and classified by each state and these procedures vary depending on the state. Also to comply with federal mandates, each state had to meet two additional requirements. Each state had to develop or adopt English Language Proficiency (ELP) standards that describe the expected outcomes of language learning trajectories and they had to develop or adopt a corresponding ELP assessment instrument to measure students’ progress in learning English. States such as California, New York, and Texas each developed their own ELP standards as well as their own corresponding assessment instrument. Oregon is part of a consortium and adopted the English Language Proficiency Assessment for the 21st Century (ELPA21) standards as well as an assessment instrument. Aside from these two requirements, states also had to develop or adopt standards and assessment instruments that aligned to the Common Core State Standards (CCSS) and New Generation Science Standards (NGSS). The ELP standards that have been developed by each state were created by convening a group of experts and stakeholders with
experience working with ELs. The ELP standards establish the ways that ELs are assumed to grow in their English language proficiency over a period of time, identify the language abilities to be expected at the different stages of language development, and they describe the aspects of language that need to be measured in order to determine progress toward proficiency (Valdés, Kibler, & Walqui, 2014, p. 6).

In learning about the differences between language development and language acquisition, the researcher is curious to know more about the various ELP standards and corresponding assessment instruments that each state uses. A future study could look at the theoretical frameworks underlying each standard and assessment instrument to see if the framework(s) align to the literature on language development or language acquisition. The researcher is most interested in the English Language Proficiency Assessment for the 21st Century (ELPA21) used to determine language proficiency, and which theoretical framework(s) was used to ground the development of this assessment as this is what is used in Oregon. However, doing a comparative analysis of all the standards and instruments could provide an overview of how experts in the field of SLA view the process of SLA.

If districts are starting to make the instructional shifts outlined by Heritage, Walqui, and Linquanti (2015) to align with the new standards but the assessment instrument has not shifted, there is a disconnect between theory, practice, and assessment of English language proficiency for ELs. A shift recommended by Heritage, Walqui, and Linquanti (2015) is a shift away from conceptualizing language in terms of structures. Literature within the ANM views assessment as authentic and based on acquisition processes of concepts and language. If the standards and
assessment instruments align more to the literature on language development, then the practices leading to students taking the assessment will not be connected to the process of acquiring a language, including a second language. Therefore, a critical lens should be used to determine how districts are held accountable for helping students acquire language. If the theory, practice, instructional materials, and assessment do not align to the literature on language acquisition, there is a huge disconnect between theory and practice to include systemic practice of implementing theory. The researcher urges states and developers of these assessments to incorporate an assessment framework grounded on the literature on language acquisition using the neuroeducation lens in order to improve outcomes for ELs.

Valdés, Kibler, and Walqui (2014) state that the “differences in the ways that standards conceptualize and measure English language growth have many serious consequences for ESL instruction” (p. 8). For example:

If it is assumed that language is a set of vocabulary and structures that can be taught in a well-established order, practiced, automatized, and put into use, then ELP standards will describe a linear developmental progression that establishes the order and sequence of vocabulary and grammatical forms and structures that students will be expected to acquire over time. ESL instruction will then be expected to produce students who can exhibit growth in the correct or fluent use of such structures or vocabulary. On the other hand, if language is viewed as a complex performance for communicating and interactively constructing meaning that involves the command of specific skills, ELP standards will instead describe the order in which particular subskills will be
acquired and directly or indirectly inform the corresponding instruction that is expected to bring about such skill development. These conceptualizations about language deeply influence instructional arrangements, classification of learners, and approaches to teaching. (p. 8)

Given the multiplicity of theories that influence the field of SLA and the different possible approaches states have used to organize language progressions and to develop assessment instruments, there has been and continues to be much variation among the states which also impacts the procedures these states use to determine when students can be reclassified as English proficient. The implication for ELs across the country is that ELs classified as active in one state may be classified as fully English proficient by different measures used in another state. Linquanti (2001) pointed out that even in the same state, the same student might be classified in various ways depending on the cutoff scores and procedures adopted by the different school districts. However, states are moving toward common cutoff scores and consistent procedures for reclassification to alleviate the inconsistencies within the state. Although there may be measures taken to provide more consistency in the assessment of ELs, future work can align the theoretical frameworks of all ELP standards and assessment instruments across the country to see how connected they are to the literature on language acquisition.

**Inclusive Practices for Dual-Identified Students**

The current educational paradigm makes a distinction between two systems of education: the regular education setting designed to meet the needs of all students and the special education setting designed to meet the needs of students with disabilities
(Heumann, 1994). However, advocates of inclusion hold a strong belief that students with disabilities should be educated in the regular education setting as they feel the current model of regular and special education fails to meet their needs (Lipsky & Gartner, 1990; Stainback & Stainback, 1992). Opponents of inclusion believe this dual model works well for students with disabilities (Vergason & Anderegg, 1992). Maurizio (1998) states “inclusion is one of the most poorly understood and emotionally laden topics surrounding both regular and special education today” (p. 18). To be included, students must be able to access the material within their own learning or acquisition system. Developmental models limit the student to fit within stages with other students.

Future work can look at ways for more integrative practices for ELSWD especially if IEP goals in reading and writing mirror the language proficiency goals of ELD. A dual-identified student is a student with dual labels such as EL and a student with a special need, or an ELSWD. Students qualifying for both of these programs wear multiple EL and special education labels. These students oftentimes do not have the same course offerings as the mainstream student without the labels. The researcher proposes future studies that look at more inclusive practices so these students are not excluded from the general education setting to receive services from different programs that could be more aligned in theory and practice. This can be done if all students can access their learning from where they are conceptually. If the beliefs of educators aligned to the literature on language acquisition, and if educators received PD on Arwood’s Neuroeducation Model and NsLLT, and PD on how to apply this model and theory, based on the results of the study, there is evidence that
beliefs can align to practice. Therefore, if all educators to include all mainstream and content area teachers understood the literature on language acquisition and received the necessary PD, ELSWD will not need to be removed for a separate course on language. There could be integration and intentional strategies used to combine efforts so ELSWDs are not having to take double the work load compared to other students.

Future work can investigate the need for separating out language acquisition from a language-learning disability and placing ELs or students with special needs in separate classrooms. If the neuroeducation and NsLLT lens are used as a framework, ELs and students with special needs may possibly receive language support in any classroom without the need to acquire language out of the general education context.

A neuroeducation and NsLLT lens appears to support more inclusive practices for all learners based on the ANM triangulation of literature (Chapter Two). Future studies can align special education Least Restrictive Environment (LRE) safeguards with ELD services and program model designs to ensure efficiency of services provided to students in these programs, particularly for ELSWD. Figure 5.1 provides a visual of a possible alignment between LRE and Most Restrictive Environment (MRE) models for both special education and EL programs that can be used as a tool to decide which programs best fit the needs of ELSWD. This is, of course, after all key stakeholders have received the necessary PD and training in implementing theory to classroom practice. This model aligns to the study in that when beliefs align to the literature on language acquisition, the practice of developing a program model that is least restrictive for ELs may change as well.
Impact of Language Acquisition on the Behavior of Newcomers

Newcomer ELs are students that have recently arrived to the country and may have some interruption in their education. Some of these students also may come with extreme trauma that impacts their acculturation into the new environment. Newcomer students will also exhibit behaviors that may be perceived as defiant or may be viewed as a rejection of the host culture. This makes newcomer students prime subjects for suspensions and expulsions due to the perceived misconduct.

Heritage, Walqui, and Linquanti (2015) proposed a shift away from using simplified text to using more complex, amplified texts as well as moving away from viewing language acquisition as an individual process to a social process. Table 4.1 showed an alignment between these shifts and ANM. Therefore, a critical lens should be used to determine how districts are guiding newcomers toward proficiency in another language using an approach that aligns with ANM as this approach may help reduce disparities in behavior incidences among newcomers.
Considering the literature on language acquisition through the neuroeducation lens establishes that language is acquired neurologically through acoustic and visual or distance senses, future work would benefit from looking at how behavior and social functioning is acquired through the same neuroeducation and NsLLT lens. Arwood and Young (2000) state, “Language is the tool for academic, behavioral, and social functioning. The language of the mind is conceptually in the form of the way the student processes concepts into symbols” (p. 129). Based on the outcomes of this study, it appears that a neuroeducation approach would help establish the best program for a newcomer student by paying close attention to how newcomers acquire a language neurobiologically and regardless of the language they come with, there is attention to sensory input that is culturally sensitive as well as attention to overlapping of patterns. When language is acquired, students are able to use this language to name concepts, therefore, increasing their ability to navigate the community they are part of as well as increasing their ability to acculturate.

Green-Mitchell (2016) studied the potential of functional language as an antecedent to the development of pro-social moral development among a sample of alternative school students. This study suggested that alternative school students had language function consistent with 3-7 year old thinking and that the behavioral programs at schools, where the subjects of the study attended, failed to provide equal access to students for pro-social moral concepts. This study also suggested that these students needed higher levels of language acquisition to be able to understand the social and behavioral expectations of the school (Green-Mitchell, 2016).
Building off of the study by Green-Mitchell (2016), there needs to be an investigation of the impact of an instructional approach grounded within language acquisition theories regarding “behavior” of newcomers. It would be interesting to conduct a study on classrooms where pro-social concepts are part of language acquisition and see how the aligned techniques impact newcomers’ behavior. The study could include the number of disciplinary referrals, suspensions, and expulsions as a key data point. The purpose would be to investigate the connection between pro-social acquisition as conceptual and disciplinary practices that come from a developmental model of expectations grounded in cognitivism. The study could mirror the study outlined in this paper and begin by analyzing the beliefs of educators on how “behavior” is acquired and then aligning these beliefs with their actual classroom management practice. Professional development on pro-social strategies could be provided to the experiment group. The control group will receive no PD.

The outcome of this research could influence legislation in creating policies that protect newcomers from extreme disciplinary punishments due to behaviors that may be a manifestation of their lack of language function in the new language. Newcomers functioning at a preoperational level of cognition need to be treated differently than students functioning at a concrete or formal level of cognition.

**Summary**

This chapter provided a summary and implications of each part of this study. The implication of Part One of the study was that the field of SLA has multiple theories that influence the instructional beliefs and practices of educators in the field and that there was alignment between SLA pedagogical shifts and ANM. The
implication for Part Two of the study is that PD makes a difference for educators and the quality of PD is critical for the bridging beliefs to practice. The researcher also shared some recommendations for practice that align to the laws that govern the program for ELs such as *Lau vs. Nichols* and *Castañeda vs. Pickard*. Such recommendations include developing a common theoretical framework using the literature on language acquisition and the neuroeducation lens. With this common theoretical framework, provide the resources such as staffing and PD that align to this framework to support effective implementation of instructional models for serving ELs. Then, again using this common theoretical framework, design and implement program models that align to this framework. Then, evaluate the impact of these models on a regular basis to determine impact on student achievement. This chapter also included future studies recommended by the researcher such as investigating the most effective accountability measure used to determine proficiency of ELs, inclusive practices for dual-identified students, and determining the impact of language acquisition on the behavior of newcomer students.

**Conclusion**

Contemporary SLA researchers (Atkinson, 2011; Mitchell, Myles, & Marsden, 2013; VanPatten & Williams, 2015) offered numerous theories, approaches, and models such as communication accommodation theory, discourse theory, variable competence model, input processing theory, DP model, interaction approach, identity theory, sociocognitive approach, complexity theory, and sociocultural theory. Even though contemporary approaches to SLA encompass many areas of acquisition, particularly for a second language learner, there is controversy over whether multiple
theories should be used to define SLA or if one theory or approach should be used to define SLA (Atkinson, 2011; Mitchell, Myles, & Marsden, 2013; VanPatten & Williams, 2015). For several decades, the field of SLA “has struggled with the nature of theories, what they are, and what would be an acceptable theory of SLA” and researchers have questioned “what is it about SLA that invites a diffusion of theoretical perspectives?” (VanPatten & Williams, 2015, p. ix). Additionally, according to Mitchell, Myles, and Marsden (2013) “grand synthesizing theories, which try to encompass all aspects of L2 learning in a single model, have not gained support” and many researchers are developing newer theoretical perspectives such as emergentism, skill acquisition theory, and sociocultural theory without displacing well established theories such as UG Theory (Mitchell, Myles, & Marsden, 2013). Other researchers (Towell & Hawkins, 1994; Truscott & Smith, 2004, 2011) have attempted to link specific theories on a more modest scale to explain all of the different aspects of SLA in order to provide more focus to the field. Some researchers have borrowed constructs from other fields without grand theorizing such as working memory from cognitive science (Mitchell, Myles, & Marsden, 2013).

This study provided evidence of a link between the pedagogical shifts recommended by Heritage, Walqui, and Linquanti (2015) and ANM as well as evidence confirming that theories and beliefs impact classroom practice. Therefore, in the context of SLA given there is not one theory or model used to define SLA practices, it is possible that SLA theories can co-exist with ANM and corresponding theory, NsLLT, since this model and theory provides the missing link to how students acquire a language including a second language.
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Appendix A

Email to Potential Survey Participants

Dear Staff Member,

Based on an extensive review of the literature, ELs are often over or under represented in special education programs and disproportionate representation of ELs in Special Education (SPED) continues to pose problems for educators (Artiles, Rueda, Salazar & Higareda, 2005). It is a challenge to discern between characteristics of language acquisition, acculturation, culture shock and an undiagnosed language-learning disability as there are overlaps of these characteristics in ELs with and without a language-learning disability such as poor comprehension, difficulty following directions, errors in grammar, syntax, and difficulty completing tasks (Chu & Flores, 2011). This dilemma of over and under representation has inspired me to conduct this study to help educational leaders and teachers better understand the natural processes of language acquisition in order to make informed decisions when placing ELs in special education programs.

The purpose of this study is to explore teachers’ beliefs about how English Learners acquire language and investigate how those beliefs are translated into classroom practices, in order to explain the disparity of English learners in special education programs using the literature from a Neuroeducation Model that examines the triangulation of literature from neuroscience about how the brain learns, cognitive psychology about how people learn to think, and language function about the acquisition of language.

Participation is voluntary and involves approximately 20-30 minutes of your time to answer a few survey questions. Please note that all information you share will be held in strict confidence and that pseudonyms will be used for all proper nouns so that all published results will be completely anonymous. The survey is anonymous and names or email addresses will not be tracked. Should you choose to participate, you are free to withdraw participation from the study at any time without affecting your relationship with the researcher, the school district, or the University of Portland.

There are no potential risks anticipated with your participation, as procedures will be taken to eliminate the risk of confidentiality breaches. The benefits associated with your participation include the opportunity to share your experience and to contribute to a study that will help improve outcomes for our English Learner Students with Disabilities (ELSWD).

This study and survey required approval from the University of Portland and the district that is the subject of this study Institutional Review Boards (IRB). Please contact me if you have any additional questions after taking the survey or if you have questions prior to taking the survey.

Sincerely, Toshiko Maurizio
Appendix B

Participant Survey Questions

1. What is your role in the district?
2. What grade level(s) do you teach/serve?
3. How many years of experience do you have in education?
4. What endorsements do you currently hold?
5. What is your experience working with English Learners (ELs)?
6. What is your understanding of how language is acquired?
7. What is your understanding of how students acquire a second language? What difference is there, if any, between first and second language acquisition?
8. What are some characteristics of neurotypical and neuro-atypical ELs? (neurotypical ELs are those whose development follows predicted outcomes and neuro-atypical ELs are those whose development does not follow predicted outcomes)
9. What are key instructional methods that should be used to teach English to ELs and how effective are these methods at helping ELs reach proficiency in English?
Appendix C

Email to Eight Selected Participants for Classroom Observations

Dear (name of potential participant),

Based on an extensive review of the literature, ELs are often over or under represented in special education programs and disproportionate representation of ELs in Special Education (SPED) continues to pose problems for educators (Artiles, Rueda, Salazar & Higareda, 2005). It is a challenge to discern between characteristics of language acquisition, acculturation, culture shock and an undiagnosed language-learning disability as there are overlaps of these characteristics in ELs with and without a language-learning disability such as poor comprehension, difficulty following directions, errors in grammar, syntax, and difficulty completing tasks (Chu & Flores, 2011). This dilemma of over and under representation has inspired me to conduct this study to help educational leaders and teachers better understand the natural processes of language acquisition in order to make informed decisions when placing ELs in special education programs.

The purpose of this study is to explore teachers’ beliefs about how English Learners acquire language and investigate how those beliefs are translated into classroom practices, in order to explain the disparity of English learners in special education programs using the literature from a Neuroeducation Model that examines the triangulation of literature from neuroscience about how the brain learns, cognitive psychology about how people learn to think, and language function about the acquisition of language.

You have been selected to be part of this study. Participation is voluntary and will involve completion of a survey and only one classroom observation. These classroom observations will help the researcher understand how your current beliefs of how language is acquired align to current practice. Please note that all information shared through these observations will be held in strict confidence and that pseudonyms will be used for all proper nouns so that all published results will be completely anonymous. Should you choose to participate, you are free to withdraw participation from the study at any time without affecting your relationship with the researcher, the school district, or the University of Portland.

There are no potential risks anticipated with your participation, as procedures will be taken to eliminate the risk of confidentiality breaches. The benefits associated with your participation include the opportunity to share your experience and to contribute to a study that will help improve outcomes for our English Learner Students with Disabilities (ELSWD).

This study required approval from the University of Portland and the district that is the subject of this study Institutional Review Boards (IRB). Please contact me if you have any additional questions after taking the survey or if you have questions prior to taking the survey.

Sincerely, Toshiko Maurizio
Appendix D

Reminder Emails

Reminder email to survey participants (phase one)

Dear Staff Member,

On December 5th, I sent the email below requesting your participation in a study I am conducting to satisfy requirements toward my doctorate in education. Your participation involves simply taking a 7-10 minute short survey by clicking this link: https://uportland.qualtrics.com/jfe/form/SV_1Xp8eHZ9SBjkDNX

Please know participation is OPTIONAL and to avoid coercion, you will receive only one more reminder email on Wednesday, December 20th, as that is when the survey link will close.

Thank you in advance for your time!

Sincerely,
Toshiko Maurizio

Reminder email to eight participants – survey and observation (phase two)

Dear Staff Member,

On November 27th, I sent the email below requesting your participation in a study I am conducting to satisfy requirements toward my doctorate in education. Your participation involves simply taking a 7-10 minute short survey by clicking this link: https://uportland.qualtrics.com/jfe/form/SV_1AAIGLXl7pAOElv and filling out this GoogleForm: https://docs.google.com/forms/d/e/1FAIpQLSdvNNUQIS4PN0HJe37eWRfe0U6kL8ha79Tg01d0uPcsmeL_Xw/viewform?usp=sf_link providing consent for ONE classroom observation that will be conducted by a former teacher.

Please know participation is OPTIONAL and to avoid coercion, you will receive only one more reminder email on Wednesday, December 20th, as that is when the survey link will close.

Thank you in advance for your time!

Sincerely,
Toshiko Maurizio
Appendix E

Classroom Observation Tool, Page 1

Observer's Checklist
What do I see in the learning environment?

1. Is there evidence of Viconic Language Methods (VLMs)?
   ___ Cartoons ___ Educator made ___ Learner made
   ___ Flowcharts ___ Educator made ___ Learner made
   ___ Learners' work displayed ___ Yes ___ No
   ___ Event-Based Schedules ___ Educator made ___ Learner made
   ___ Event-Based Pictures ___ Educator made ___ Learner made

2. Can I see what the teacher is doing without any words being used to explain what is done?
   ___ Yes ___ No Content Area
   Desired Outcomes

3. Can I see what the students are intended to do on a specific task without any words being used to explain the task?
   ___ Yes ___ No Content Area
   Desired Outcomes

4. Are the learners participating in an event?
   ___ Yes ___ No
   ___ Scientists investigating questions ___ Mathematicians solving problems
   ___ Authors writing narrative, expository, or persuasive pieces ___ Historians researching social dilemmas or social complexes

5. Are the learners resourcing materials for information gathering?
   ___ Yes ___ No
   ___ Books ___ Articles or Journals ___ Magazines ___ Search engines
   ___ Encyclopedia ___ Newspaper ___ Other: ____________________________

6. Are there multiple varieties of resource materials for students to use as an agent within an event?
   ___ Yes ___ No
   ___ Books ___ Articles or Journals ___ Magazines ___ Search engines
   ___ Encyclopedia ___ Newspaper ___ Other: ____________________________
7. Are the learning opportunities progressing developmentally?  
   ___ Yes  ___ No
   
   Preoperational learning opportunities to multiple concrete examples?  
   ___ Yes  ___ No
   
   Examples _______________________

   Concrete examples to formal understanding of concepts that can be represented with the learners' own natural language?  
   ___ Yes  ___ No
   
   Examples _______________________

8. Is the learning environment organized by space?  
   ___ Yes  ___ No
   
   Examples _______________________

9. Do learners have individual strategy checklists to help them advocate for their own learning?  
   ___ Yes  ___ No
   
   Examples _______________________

10. Are learning opportunities organized by space?  
    ___ Yes  ___ No
    
    Examples _______________________

Suggestions towards a continual paradigm shift to Neuro-Viconic Education:

All Children Can Learn Because All Learning is Brain-Based (NLLT)

All Children Learn to be Pro-Social (RESPECT)

All Children Learn through Context (EBL)

All Children Learn to Think (VLM's)
Appendix F

Participant Consent Form

Title
Language Acquisition versus Language Development An investigation of current beliefs of how English Learners (ELs) acquire language and how these beliefs translate into practice in order to explain the disparity of ELs in special education programs

Purpose of Research
The purpose of this study is to explore teachers' beliefs about how ELs acquire language and to investigate how those beliefs are translated into classroom practices in order to explain the disparity of ELs in special education programs. This study will use the literature from a Neuroeducation Model that examines the triangulation of literature from neuroscience (how the brain learns), cognitive psychology (how people learn to think), and language function (the acquisition of language).

Procedures
You will be asked to complete a survey that will take you approximately 10-15 minutes in length. The survey will focus on your beliefs of how ELs acquire language. Then, the researcher will complete one classroom observation at a time that is agreed upon in advance. The observation will be planned and you will have a copy of the observation tool prior to the observation. You will also have an opportunity to debrief the observation with the researcher at your convenience.

Benefits
You will experience the potential benefit of a short reflection on how language acquisition is taught during the debrief. The results will inform ways in which the district can improve how we approach the process of language acquisition in order to, in turn, explain the disparity of English Learners in special education programs. The benefits associated with your participation include the opportunity to share your experience and to contribute to a study that will help improve outcomes for our English Learner Students with Disabilities (ELSWD).

Risks and Confidentiality
There are no potential risks anticipated with your participation, as procedures will be taken to eliminate the risk of confidentiality breaches. To assure there are no risks, participants will not be able to be identified of their participation in the survey or observation. Your responses will only be reported through the use of pseudonyms and generalized data. Your identity will be kept confidential to the extent provided by law and your identity will not be revealed in the final manuscript. If you experience distress in any form, the researcher will provide local counseling resources.
Audiotape
With your permission, I would like to audiotape the classroom observation and our debrief after the observation. You are not expected to answer any question that makes you feel uncomfortable. I will be transcribing the observation and our debrief. The transcribed data will be kept on a secured, password protected computer of the researcher. I will be the only one with access to the transcribed data.

Opportunity to Ask Questions
You may ask any questions concerning this study and have those questions answered before agreeing to participate in or during the study. Sometimes study participants have questions or concerns about their rights. In that case, you may contact the University of Portland Institutional Review Board at irb@up.edu.

Freedom to Withdraw
Participation in this study is voluntary. You can refuse to participate or withdraw at any time without harming your relationship with the researcher, the district that is the subject of this study, or the University of Portland, or in any other way receive a penalty or loss of benefits to which you are otherwise entitled.

Consent, Right to Receive a Copy
You are voluntarily making the decision whether or not to participate in this research study. Your signature certifies that you have decided to participate having read and understood the information presented. You will be given a copy of this consent form for your records.

I have read the procedure described above for the study. I agree to participate in the study and have received a copy of this description.

__________ I agree to be audiotaped for the observation and debrief

__________ I do NOT agree to be audiotaped for the observation and debrief

Signature of Participant:

__________________________________________________________
Participant Name (PRINTED)    Participant Signature

__________________________________________________________
Date

Name and Phone Number of Researcher:  Toshiko Maurizio, Principal Researcher, Office:  503-356-3756; Cell:  503-888-5207, Email: maurizio18@up.edu