A Literature Review on The Multifaceted, Complex Relationship Between

English as a Second Language,

Special Education and L2 Reading Disability Potential Risk Factors

And

Neuroscience

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Abstract

The multifaceted, complex relationship between English as a Second Language, special education, and neuroscience is of utmost significance in U.S. schools. This literature review explores these relationships and also addresses concerns around formal and informal assessment, professional support and training/certification for educators and specialists, and effective strategies and interventions for struggling English learners. Neurological imaging illuminates the brain regions impacted in elementary and adolescent English learners who demonstrate typical and atypical language development. Educators, particularly special education and English as a Second Language teachers, and specialists can use this information as a guide to determine why the English learner is struggling and create appropriate intervention in order for the student to achieve success in the least restrictive environment. Special education and English as a Second Language teachers are at the forefront of providing direct services to K-12 English learners who demonstrate struggle with second language acquisition. A critical issue is determining whether the English learner is struggling due to a language difference or a learning disability. However, they need professional support, training, and knowledge of effective strategies in order to support struggling English learners. Thirty-four articles that meet the criteria are analyzed; results of the identified studies and limitations are reported. The interrelationships between English as a Second Language, special education, and neuroscience, are significantly important in order for all English learners to be effectively supported in the general education classroom setting.

Key Terms:

English as a second language, neurological imaging studies, brain hemispheric involvement and impact on second language learning, monolingual vs. bilingual adolescent and adult learners, age of second language acquisition, proficiency, socioeconomic status, elementary English learners, reading disability in English, supporting educators and English learners, language difference vs. learning disability
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Second language acquisition from childhood through adulthood is significantly impacted by structures in both the right and left hemispheres in the brain that process language. An individual’s degree of proficiency in his or her first language (L1) greatly determines one’s ability to learn and demonstrate proficiency in the second language (L2). When the English learner struggles with reading, written, and comprehension skills in English, the discrepancy between knowledge of L1 and L2 is significantly increased. Neurological, medical imaging such as functional magnetic resonance imaging provides insight into the hemispheric changes in the brain’s language processing regions; as a result, imaging reveals the typical process of learning a second language and also what happens when the English learner is struggling to learn L2. Educators, specialists, clinicians, and parents/guardians can use the information provided in medical imaging studies to enhance their practice when working with elementary English learners; understanding that both the right and left hemispheres are involved during language processing, educators, specialists, and clinicians can utilize this information when determining if the English learner has a language difference or a learning disability. In addition, these professionals will be better equipped to provide strategies that will best meet their students’ needs during L2 development. Administrators can use this information to better support special education and English as a Second Language personnel through focused professional
development designed to enhance their knowledge of research-based effective strategies when working with struggling elementary English learners.

Understanding the multifaceted, complex relationship between English as a second language and neuroscience is integral to understanding the neurological and educational factors that lead to elementary and adolescent English learners’ challenges to acquiring and developing proficiency in English (L2). In the following, I provide:

- A rationale for focusing on elementary English learners, define terminology specific to neuroscience/medical imaging, and explain the integral connection between Phases I and II of the research.
- Discussion of the methodology used to present and analyze the current research for Phase II.
- Provision of in depth insight into the neurological imaging that details information about the brain’s structures and the specific region(s) in the right and left hemispheres that are impacted and activated during second language acquisition (Phase I) and also when the English learner demonstrates struggle learning English (Phase II).
- Integration of the clinical neurological imaging and information and the implications of this research for educators, specialists, clinicians, and parents who work with elementary English learners both those who struggle to learn English and typical development for second language acquisition.

A positive, correlative relationship is seen between clinical neuroscience and second language acquisition. The language processing centers in both the right and left hemispheres in the brain have proven to be activated during an individual’s study of a second language. Therefore, second language acquisition is a highly complex process that involves several critical features that must align in order for successful learning of and ultimately mastering, a second language.
When an elementary or adolescent English learner demonstrates struggles with learning English, the integral question of whether the struggle is due to a language difference or a learning disability is the central focus. Serpa (2005) provides detailed information of the differences in the *Language Difference vs. Learning Disability Assessment Model*. The six facets of the model are, “theoretical/philosophical foundation, cultural diversity understanding, legal and ethical provisions, social/emotional dimensions, cultural and linguistic journey, and language knowledge” (Serpa, 2005).

Clinical neurological imaging illuminates the differences in the activated brain regions between typically developing readers and struggling readers. When combined with the educational research on the disproportionality of struggling elementary and adolescent English learners receiving special education, clarity is provided on both the medical and educational reasons for English learners who struggle to learn reading and writing skills in English and those who follow the typical path for second language acquisition.

Learning a second language as an elementary or adolescent learner is a highly complex process. Understanding the varied neurological studies not only provides evidence that there is a positive correlation between neuroscience and second language acquisition, but also illuminates the exact regions of the brain that are activated and involved in both typical and atypical language development. Therefore, I want to further investigate the impact of neuroscience on second language acquisition in elementary and middle school students and those who may be at risk for a reading disability in English by addressing my research questions from phases I and II of the research:

1. What does the current body of research say about the impact of neuroscience on second language acquisition for adolescent and adult learners between 2009-2017?
2. How does an elementary aged English Language Learner’s demonstrated current proficiency level and cognitive ability in L1, potentially impact the child’s classification of being at risk for a reading disability in English (L2)?

3. How do programs in schools guide identification of elementary and adolescent English Language Learners’ literacy needs and the possible need for special education services?

4. What role does formal and informal assessment serve in identifying an elementary or adolescent English Language Learner who has a language difference vs. language disability in English (L2)?

**Method**

The majority of the neuroscience research has used *functional magnetic resonance imaging* as the foundational design to determine the involvement and degree of bilateral hemispheric involvement in regard to typical and atypical development in elementary and adolescent English learners. My research analyzes the clinical neuroscience and explores the integral role that *functional magnetic resonance imaging* serves in analyzing bilateral hemispheric development; further information is provided regarding the impact on second language acquisition in elementary English learners who demonstrate learning challenges. The clinical outcomes indicate defined brain structures involved in L2 language development. In reference to English as a second language and neuroscience, additional neurological imaging studies have been used, such as electromyography (EMG), skin conductance (SC), electroencephalography (EEG), magnetic resonance imaging (MRI), and voxel-based morphometry (VBM) in illuminating the language processing regions of the brain and their application to second language acquisition. The findings of the neurological imaging studies
illuminate the specific region(s) that impact L2 language development both typical and atypical, illustrate how an individual’s age of second language acquisition impacts L2 learning and proficiency, and highlight the role that socioeconomic status serves during second language development in elementary English learners.

The purpose of this literature review is to present and analyze the current body of literature regarding the connection between neuroscience, second language acquisition, special education, and potential risk factors for a reading disability in English; the particular focus is on learning a second language during childhood and early adolescence. In order to gain further knowledge of the interrelationships between these complex topics and to determine the extent that second language acquisition is impacted, a literature review study was conducted. For this literature review, I have chosen a number of criteria for the article selection process. These criteria are listed below:

1. Articles were either peer-reviewed or not peer-reviewed but provided important, relevant information published between 2005-2018.

2. Studies had to include quantitative, qualitative, mixed-methods, arts-based research, government report, position paper/statement, literature review, professional practice meta-analysis, or other research designs.

3. Studies were concerned with any of the major topics: English as a second language and neuroscience, elementary and adolescent English Learner potential risk factors for a reading disability in English, English as a second language and special education, supporting English learners with identified learning disabilities in the least restrictive environment, and supporting special education teachers and Teachers of Speakers of Other Languages.
4. Studies examined the impact of and interrelationship between these topics.

**Data Collection**

This literature review explored the multifaceted, complex relationship between English as a second language, an elementary or adolescent English learner potentially being “at risk” for a reading disability in English, and how neuroscience impacts both second language acquisition and also reading disability risk from 2005-2018. I first decided on key words for this search by examining articles written about first English as a second language and neuroscience (phase I) and then expanding on this research through integration of potential risk factors for a reading disability as an elementary English learner, educational techniques for supporting English learners with learning disabilities in the least restrictive environment, supporting special education teachers and teachers of English to speakers of other languages (phase II). After the key words and time were determined, I decided to use several search engines to gather my articles.

For phase I, I used Lesley University’s main research page. After much trial and error, I was brought to JSTOR, PubMed, Academic Search Premier, and neuroscience specific medical and linguistic journals. For phase II, I used the following descriptors to search Lesley University’s main research page and Google Scholar: learning disability, reading/literacy disability, elementary English learner, risk factors for a reading disability in English, reading intervention, special education and English as a second language, formal and informal assessment and English as a second language. This procedure yielded over 100 articles, and with careful examination, I was able to decide on articles that fit my literature review criteria. A total of 34 articles were chosen for the final round.
Results

Topic I: English as a Second Language and Neuroscience

Neurological imaging used to determine hemispheric involvement

Neurological imaging is a major component of determining the involvement of specific brain structures in second language acquisition during adolescence-adulthood; in addition, diagnostic imaging tests such as functional magnetic resonance imaging (fMRI), structural magnetic resonance imaging (MRI), electromyography (EMG), encephalography (EEG) and voxel-based morphometry (VBM) provide detailed information specific to the involved language processing regions, the degree of right and left hemispheric involvement, and the density of the grey/white matter during language development.

Archila-Suerte, Zevin, and Hernandez (2015), Yang, Gates, and Molenaar (2015), and Pliatsikas, Johnstone, and Marinis (2014) conducted fMRI studies in order to determine the specific brain structures involved in second language acquisition during adulthood, neural changes that occur, and the impact on functional vs. effective connectivity. According to Archila-Suerte et al. (2015), “An individual’s ability to correctly perceive L2 sounds may be predicted by neuroanatomical differences of the left insula/prefrontal cortex, left temporal lobe, and bilateral regions of the parietal lobe” (p. 37). An important implication that can be drawn is that bilateral structural involvement and the resultant neural changes directly impact an individual’s ability to understand the sounds of English. Therefore, as adolescent and adult learners of English strive to learn the sounds of English and understand how they are similar or different from their native language, the results of the fMRI studies can be used to better understand the challenges non-native speakers face when learning English.
The functional magnetic resonance imaging (fMRI) results of the bilateral superior temporal gyrus, the bilateral rolandic operculum, the bilateral middle frontal gyrus, and the bilateral inferior parietal lobule, as seen in Figure 1, illustrate the relationship between an individual’s age of second language acquisition and second language proficiency. Imaging results indicate that late bilingual and monolingual speakers, who had equal socioeconomic status, demonstrated increased activation in the superior temporal gyrus (Archila-Suerte et al., 2015, p. 45). The fMRI results, therefore, highlight the specifically involved brain structures during second language acquisition; thus, the imaging results provide substantial insight regarding the integral relationship between an individual’s age of acquisition and L2 proficiency.

The EEG study conducted by Reiterer, Pereda, and Bhattacharya (2009) clearly indicated that that the lower proficiency group had the most structural involvement in the right hemisphere for second language processing, specifically, the fronto-central (fronto-parietal) region (Reiterer et al., 2009, p. 90). The results of the EEG study can be compared to the results of the fMRI studies.
Although they are quite different clinical neurological tests, both imaging exams clearly indicated that there is a definitive connection between L2 proficiency and the involved brain structures. An important, complex, implication is that the comparable medical imaging studies highlighted the relationship between bilateral involvement, age of second language acquisition, and how L2 proficiency is impacted as a result.

Pliatsikas et al. (2014) indicated that the right hemisphere is directly involved during the morphological processing of L2 (p. 6), and both native English speakers and English learners both understand English inflection as seen bilaterally in the brain. Yang et al. (2015) showed positive fMRI results for increased neural activity in the bilateral posterior middle temporal gyrus and angular gyrus along with involvement in both the right and left hemispheres; pitch discrimination, semantic processing, tone discrimination, and prosodic learning and processing were also shown on the fMRI results. Neural activity is, therefore, consistent with the experience of learning a second language.

Vocabulary acquisition in L2 is crucial to effectively learning and using language. The MRI/VBM study conducted by Grogan, Parker-Jones, Ali, Crinion, Orabona, Mechias, Ramsden, Green, and Price (2012) and the EMG/SC study conducted by Baumeister, Foroni, Conrad, Rumia, and Winkelman (2017) provided enhanced insight into the connection between second language development during adulthood, emotional memory between L1 and L2 words, and the density of grey matter. Results indicate that L1 words with emotional context evoked a greater emotional response than L2 words (Baumeister et al., 2017, p. 9). MRI results indicated that a higher level of grey matter was located in the right hemisphere in multilingual vs. bilingual adult speakers in addition to discovering that density of grey matter did not positively correlate with age of acquisition or an individual’s ability to efficiently use language (Grogan et al., 2012, p.
The results, therefore, show that vocabulary development in L2 is directly correlated with the right hemisphere. The results of this study illuminate the connection between L1 and L2 and describe the impact on a non-native English speaker’s ability to read words that have an emotional connection.

**The role of the right and left hemispheres in second language acquisition**

Bilateral hemispheric involvement serves an integral role in second language acquisition during adolescence-adulthood. Results from Hosada, Tanaka, Nariai, Hona, and Hanakawa’s (2013) cross-sectional study, “showed that bilateral front-subcortical-parietotemporal areas, predominantly in the right hemisphere, might underlie superior L2 vocabulary ability in late L2 learners” (Hosada et al., 2013, p. 13668). The results of this study showed increased activation in these right hemispheric structures, therefore highlighting the strong relationship between language processing in the right hemisphere and a well-developed L2 vocabulary. An important implication that can be drawn from this study is that adolescent and adult English learners have a strong positive relationship between the right hemisphere and vocabulary acquisition.

Bilingual versus monolingual brain structure lateralization was central to the fMRI study performed by Połczyńska, Japardi, and Bookheimer (2017). Therefore, lateralization for language can occur bilaterally; however, bilingual speakers commonly show increased activation in right hemisphere, compared to monolingual speakers but increased activation in left hemispheric structures can occur in both groups (Połczyńska et al., 2017, p. 4). This study provides results similar to the fMRI, EEG, and EMG/SC neurological studies. An important implication is that second language acquisition occurs bilaterally; both the right and left hemispheres serve an integral role in language development.

The functional magnetic resonance imaging (fMRI) highlighted the areas of neural activity; as seen in Figure 2, the relationship between pre and post training is illustrated when the
An English learner is given a task involving tone discrimination, onset discrimination, and pitch discrimination.

*Figure 2: Pre-training vs. Post-training*

Tone Discrimination, Onset Discrimination, and Pitch Discrimination

(Yang et al., 2015, p. 41)

The results from Yang et al. (2015) indicate that, successful learners: demonstrated a more connected and strengthened multi-path network, showed substantial differences in the language processing regions than less successful learners, and depend on different brain network patterns to understand Chinese and lexical information of L2 words.

**Topic II: The Impact of Neuroscience on English as a Second Language and Elementary English Learners with Learning/Reading Disabilities**

Clinical neuroscience research supports the rationale that there are neurological changes that occur when the elementary or middle school English learner is suspected of having or has a learning/reading disability in English. Functional magnetic resonance imaging (fMRI) and voxel-based morphometry (VBM) are two neurological imaging tests that have been utilized to determine the exact neural changes and impacted brain region(s) when an elementary English learner is struggling to learn English.
Meng, You, Song, Desroches, Wang, Wei, Tian, Gaab, and Ding (2016) utilized fMRI to determine whether neural deficits are present in Chinese children who are English learners in grades 4, 5, and 6 who demonstrate reading difficulties. fMRI was utilized in order to measure task accuracy and reaction time between a rhyme judgment task and a tone discrimination task. Figure 3 shows the neural activity between these tasks and activated brain regions between typically developing and struggling English learners.

Figure 3:

_Rhyme Judgment vs Tone Discrimination in Typical ESL Readers vs. Impaired ESL Readers_

During the study, the children were placed into two different groups: typically developing and reading impairment. fMRI results concluded that increased neural activity was observed during the rhyme judgment vs. tone discrimination in children in the typically developing group, in the following regions: bilateral temporal lobes, bilateral inferior frontal gyrus, bilateral precentral gyrus, left occipital lobes, left supplementary motor area, right insula, and several
subcortical areas (Meng et al., 2016). Significantly increased activation was observed in the following brain regions: left inferior occipital/fusiform, left precentral, bilateral superior parietal, inferior temporal regions, and bilateral cerebellum (Meng et al., 2016).

For children in the reading impairment group, the fMRI showed increased neural activity during the rhyme judgment vs. tone discrimination task in the following brain regions: bilateral temporal lobes, left inferior frontal, right superior occipital, right fusiform, left lingual, right precentral, bilateral insula, left supplementary motor areas, and some subcortical regions (Meng et al., 2016).

The results from Meng et al. (2016) provide critical insight into neural activity between typically developing and struggling English learners in regard to reading. There is a relationship between brain activity and functional connection in children who speak English as a second language in their auditory phonological and behavioral reading skills. The lack of differences between the typically developing reading group and the reading impairment group in the left superior temporal gyrus indicates for children who speak English as a second language, phonological representation and low-level acoustic processing might be intact in children who speak English as a second language and have a reading impairment; this conclusion is the most important result from Meng et al. (2016).

Girbau-Massana, Garcia-Marti, Marti-Bonmati, and Schwartz (2014) utilized voxel-based morphometry (VBM) and fMRI in order to investigate gray and white matter volume and cerebrospinal fluid volume in elementary English learners who have a specific language impairment and/or reading disability in English compared to English learners who show typical language development.
During this study, 10 children who spoke Spanish as L1 who had a specific language impairment and 14 children who spoke Spanish as L1 but demonstrated typical language development, participated. Figure 4 shows the VBM imaging results that highlights the gray matter volume in the brain between these two groups in the right postcentral parietal and right and left medial occipital gyri.

Figure 4:

*Gray Matter Volume in Children with Specific Language Impairment vs. Typical Language Development*

*Right Postcentral Parietal, Right and Left Medial Occipital Gyri*

As seen in Figure 4, the results of this VBM imaging scan demonstrate that the English learners who had a specific language impairment had substantially smaller gray matter volume than the English learners following typical language development (Girbau-Massana et al., 2014).
Girbau-Massana et al. (2014) further investigated the volume of gray matter in the elementary English learners with specific language impairment compared to children exhibiting typical language development. Figure 5 highlights the VBM imaging scan in regard to the superior occipital gyrus.

Figure 5:

Gray Matter Volume in Children with Specific Language Impairment vs. Typical Language Development

Superior Occipital Gyrus

(Girbau-Massana et al., 2014, p. 96)

As seen in Figure 5, the results of this VBM imaging scan demonstrates that the English learners who have a specific language impairment showed substantially increased gray matter volume than the children in the typical language development group (Girbau-Massana et al., 2014).

Girbau-Massana et al. (2014) further investigated the correlation between elementary English learners with specific language impairment and a reading disability when compared to
the children demonstrating typical language development. The results, which are seen in Figure 6, highlight the differences between these groups in the right postcentral parietal gyrus.

*Figure 6:*

Gray Matter Volume in Children with Specific Language Impairment and Reading Disability vs. Typical Language Development

Right Postcentral Parietal Gyrus

(Girbau-Massana et al., 2014, p. 97)

As seen in Figure 6, the VBM imaging scan demonstrates that the English learners who had a specific language impairment and reading disability, had a substantially smaller volume of gray matter when compared to the children who demonstrated typical language development (Girbau-Massana et al., 2014).

In addition to the volume of gray matter the English learners demonstrated between those with a specific language impairment and reading disability and those demonstrating typical language development, Girbau-Massana et al. (2014) investigated the volume of white matter.
Figure 7 shows the results of the VBM study in regard to white matter volume in regard to the right inferior longitudinal fasciculus.

Figure 7:

*White Matter Volume in Children with Specific Language Impairment and Reading Disability vs. Typical Language Development*

*Right Inferior Longitudinal Fasciculus*

(Girbau-Massana et al., 2014, p. 97)

As seen in Figure 7, the VBM imaging scan demonstrates that the English learners who had specific language impairment and reading disability had a substantially smaller volume of white matter than the children who showed typical language development (Girbau-Massana et al., 2014).

**Important Conclusions between English as a Second Language, Typical Language Development and Specific Language Impairment/Reading Disability, and Neuroscience**

The research shows a positive correlation between English as a Second Language, typical language development and specific language impairment/reading disability, and neuroscience.
Functional magnetic imaging, voxel-based morphometry, encephalography, skin conductance, and structural magnetic resonance imaging are the most commonly referenced neurological imaging scans in regard to English as a second language and how second language acquisition impacts brain development.

Functional magnetic resonance imaging and voxel-based morphometry are the two most highlighted neurological imaging tests throughout the research in identifying and highlighting the structural differences in elementary English learners in regard to struggling to acquire English literacy skills. The clinical neurological imaging illuminates the brain regions that are impacted when an English learner is asked to perform a certain task, determine the difference between rhyme, tone, and pitch, and age and sociocultural related factors, all of which can impact an English learner’s ability to acquire English literacy skills.

At the K-12 level and adult education, educators, specialists, administrators, and parents/guardians can gain tremendous insight into second language acquisition and how to notice when a student is following typical second language acquisition and also when the English learner is struggling with the language; provision of appropriate intervention can be individualized and implemented as soon as possible.

**Topic III: Language Difference vs. Learning Disability**

Determining whether the English learner is struggling due to a language difference or a learning disability is an extremely important, critical question in the research. Serpa (2005) investigated differentiating factors between them in her project *The Language Minority Assessment Project: ELL Assessment for Language Differences vs. Learning Disabilities*. Serpa (2005) provides critical insight into the following six domains of the Language Differences vs. Learning Disabilities Assessment Process: “theoretical foundation, cultural understanding, legal
and ethical provisions, social and emotional dimensions, cultural and linguistic journey, and language knowledge.” Each of these factors is integral for educators and specialists to be aware when working with English learners who demonstrate challenges developing English literacy skills. Serpa (2005) explains that, “As educators explore the major understandings inherent in the questions posed for each facet of the LDLD model, they will gain essential and necessary knowledge about how linguistic and cultural factors affect their perceptions of each student’s performance in USA schooling.”

English learners enter US schools with varying levels of educational experience, background knowledge of English, and differing proficiency levels in their first languages, which may be alphabetic or non-alphabetic; all of these factors can potentially impact an English learner’s ability to understand and demonstrate ongoing proficiency in English. As the student progresses through the grades, if a struggle is observed, the educational team is faced with the challenge of determining if the struggle is due to a language difference or an actual learning disability. The *Language Differences vs. Learning Disabilities Assessment Model*, therefore, provides integral information that assist the educational team in determining the root of the struggle and how best to intervene in order to meet the English learner’s educational, cultural, and linguistic needs.

Serpa (2011) further investigated how learning disabilities are addressed in special education. In this research report, Serpa (2011) focuses on special education and education for English learners who have disabilities in the Commonwealth of Massachusetts. The report is broken into the following six domains: “introduction, laws that work together to protect the rights of ELL students with disabilities (ELL-SWDs), eligibility for special education of ELL-SWDs, program placement: FAPE and LRE, availability of professionals prepared to serve ELL-
SWDs, and recommendations” (p. 1). Serpa (2011) explains that the three major laws designed to protect ELL-SWDs are: “Civil rights laws, language learning education laws, and special education laws” (p. 2). Serpa (2011) further explains that:

The rights of ELL students with disabilities (ELL-SWDs) are protected by all three sets of laws. This means that all educators who are responsible for educating ELL-SWDs must implement practices that are governed by the simultaneous use of Civil Rights, English Language Learning, and Special Education laws in order to provide this population of the state’s K-12 students with a free and appropriate education in the least restrictive environment. Struggles in learning due to language barriers are not a Special Education need per se. Not knowing English requires Language Learning Education, not Special Education. This is made clear in federal and state policies. (pp. 2-3)

This information is integral to comprehend when the educational team is deciding appropriate intervention for an English learner who is demonstrating a struggle with acquiring English literacy skills. When the team is deciding if the student has a language difference or a true learning disability, all three laws must be appropriately followed; the team must also understand the differences between English Language Education and Special Education when deciding how best to proceed with academic and linguistic intervention.

Sullivan (2011) also addressed this critical point between determining if an English learner is struggling due to a language difference or a true learning disability. She explains that, “Another difficulty facing practitioners in distinguishing linguistic difference from disability, particularly a learning disability (LD), is the tendency for both students identified as ELLs and students identified with LD to perform poorly on academic tasks with high language demands, which may make ELLs even more vulnerable to misclassification as having a disability”
(Sullivan, 2011, p. 320). She explains that ELLs are commonly placed in special education for convenience or when teachers truly do not know the best way to effectively educate these students (Sullivan, 2011). Therefore, language differences vs. learning disabilities serve an integral role in an English learner’s struggle with acquiring the English language.

García and Tyler (2010) addressed the challenge that educators face when trying to determine if the English learner is struggling due to a language difference or a true learning disability. They provide important criteria for educators and specialists to be aware when working with struggling elementary and adolescent English learners. It is explained that:

For ELLs with LD being taught academic content in English, teachers must consider the interaction between second language learning and LD. These students are likely to have struggled with reading in their first language; now they must not only learn the discrete skills associated with English proficiency (i.e. syntax, grammar, vocabulary, and punctuation), but must be able to use their English in culturally specific ways valued at school. Typically, these pragmatic aspects of language use are reflected not only in academic criteria related to oral and written expression, but also in norms for classroom interaction and behavior. In addition, their LD is likely to increase the cognitive demands of a lesson, thereby interfering with attention to the concepts being taught. Depending on the specific areas of reading affected by their disability, they may also experience greater difficulty with decoding new vocabulary, visual or auditory processing, retaining new information, and/or organizing ideas. At minimum, it is important for teachers to know that ELLs, including those with LD, may have been prematurely exited from bilingual education or ESL instruction prior to becoming proficient users of academic English such
as that found in secondary textbooks and classroom materials. (Garcia and Tyler, 2010, pp. 115-116)

Elementary and adolescent English learners with disabilities enter U.S. schools with a wide range of cultural backgrounds, knowledge of English, and previous schooling experiences. When the English learner begins to demonstrate a struggle in the general education curriculum, the general and special education teachers are faced with trying to determine if the struggle is due to a language difference or a true learning disability. Educators and specialists can use the information regarding second language learning and a learning disability, along with referring to Serpa (2005)’s Assessment Model, in determining the most appropriate educational decisions for English learners with disabilities. These challenges make it difficult for educators and specialists to determine whether special education is the most appropriate placement for struggling English learners; the push for educating these students in the least restrictive environment makes the educational team’s decision even more difficult.

However, when special education is an appropriate placement for English learners with disabilities, Fernandez and Guzman (2014) explain that struggling English learners can be placed into three groups. These groups can be used to determine the three types of English learners with disabilities in determining whether special education, general education, or a combination, is the most appropriate. It is explained that:

Type I is the student who has problems that result from difficulties that occur in the teaching-learning environment…This type may use curricula or instructional methods that do not reflect the student’s life experience, particularly for those who are culturally diverse. Method and materials that do not capitalize on what is familiar to the student, result in learning difficulty for the student. Type II are students have for whatever reason
gotten behind and need more time to learn one portion of the curriculum before moving to advanced levels…Not addressing this additional time needed or scaffolding of cognitive activities can create learning difficulties…Both group 1 and 2 have difficulty not because they a genuine disability but because the education does not promote success for them. Type III…includes those students, who have real disabilities…These students require special education services. The challenge for educators is in determining which students are which. Some students benefit from general education placement, others from special education and others from some combination of the two. But all require an education that matches education to their student profiles. Education that does not capitalize on student characteristics, whether the student is considered mainstream or diverse, ends in a created learning disability. (Fernandez & Guzman, 2014, pp. 3-4)

Determining if the English learner is struggling due to a language difference or a true learning disability is at the center of the research and is a critical problem that educators and specialists struggle with as they make assessment and placement decisions for struggling English learners.

**Topic IV: Potential Risk Factors for a Reading Disability in English**

When an elementary English learner is struggling to acquire English literacy skills, the research highlights potential factors that could put the child at risk for a reading disability in English.

Swanson, Orosco, and Kudo (2017) conducted a cohort-sequential study investigating whether working memory impacts second language reading growth in children who spoke Spanish as L1 in grades 1, 2, and 3. The goal was to determine children at risk and not at risk for a reading disability. Swanson et al. (2017) explain that, “Of those children with reading difficulties, several may be at an increased risk for reading disabilities (RD). Unfortunately, the
reason behind the prevalence of reading difficulties who are English language learners (ELLs) in the public school system is unclear because neither a method for accurate identification nor a consistent definition across states exists. These issues underscore the need for better tools and methods for accurately identifying ELL children at risk for RD” (p. 386). Swanson et al. (2017)’s results indicated that the children at risk for a reading disability were at a significant disadvantage across the three waves of testing in academic and cognitive areas when compared to the children deemed not at risk for a reading disability. Further results indicated that RD vs. non-RD were isolated to the executive component of working memory in English (Swanson et al., 2017). Therefore, working memory is an essential contributing factor that ultimately determines the presence or lack of a reading disability in struggling English learners.

Swanson, Orosco, and Lussier (2012) conducted a longitudinal study to examine the cognitive aspect of reading disabilities in children who were native Spanish speakers in grades 1, 2, and 3. Results showed that the Spanish-speaking children English learners at risk for a reading disability and bilingual children, shared similar characteristics in phonological processing and naming speed in addition to working memory related to language and level of need in the classroom (Swanson et al., 2012). Another important result was that although the children at risk for a reading disability in both bilingual and ELL groups demonstrate similar cognitive challenges, however, the phonological processing in Spanish brings out performance differences in the bilingual group only between reading disability and non-reading disability groups (Swanson et al., 2012). Also, “when measures of age, fluid intelligence, Spanish phonological processes, and Spanish STM [short term memory] were partialled out in the analysis, the results showed that ELL children at risk for RD underperform ELL children without RD on both English and Spanish measures related to the executive component of WM [working memory].
Thus, a general language-processing deficit related to the executive component of WM emerged separating ELL children with and without RD” (Swanson et al., 2012, pp. 314-315). A key result was that working memory and phonological processing in English, and word processing in Spanish were important differentiating factors between RD vs. non-RD in both bilingual and ELL groups (Swanson et al., 2012). A unique separating variable at risk or not at-risk for RD in the bilingual group was their performance on English syntax (Swanson et al., 2012). This result indicates that establishing the difference between a reading disability vs. a non-reading disability is similar in both ELL and bilingual groups and that participants shared similar difficulties in cognitive challenges and also that the phonological system in L1 serves an integral role in determining cognitive differences between bilingual reading disability vs. bilingual non-reading disability (Swanson et al., 2012).

Petersen and Gillam (2013) examined predictor factors for a future reading difficulty for bilingual Latino kindergarten children, who were considered to be at risk for language impairment, in a longitudinal study. Assessments were given in both English and Spanish that measured letter identification, phonological awareness, rapid automatized naming, and sentence repetition; English language proficiency, language ability, socioeconomic status, and preschool attendance at kindergarten were also measured.

Reading comprehension and word-level reading in English were measured at the end of first grade. According to Petersen and Gillam (2013), “The prevalence of reading problems, however, is a significant concern in the United States, especially for children who are culturally and linguistically diverse” (p. 113). Results were conclusive that, “Although the kindergarten reading-related English, reading-related Spanish, and reading-related BLS \textit{[Best Language Scores]} measures (Letter ID \textit{[Letter Identification]}, PA \textit{[Phonological Awareness]}, RAN \textit{[Rapid}
Automatized Naming], and SR [Sentence Repetition]) accounted for significant variance in all four of the first grade criterion measures, the reading-related Spanish measures did not account for significant variance over and above the reading-related English measures” (Petersen & Gillam, 2013, p. 124). In regard to kindergarten descriptive measures, Petersen and Gillam (2013) concluded that, “ELP [English Language Proficiency] and LA [Language Ability] significantly accounted only for the first grade word ID [Word Identification] and RC [Reading Comprehension] criterion measures, and those predictor measures only accounted for significant, unique variance over the reading-related measures for the first grade RC criterion measure” (p. 124). The results illustrate the correlative relationship between the English reading and kindergarten descriptive measures. Therefore, these measures are significantly important to predicting reading difficulty risk factors in bilingual Latino children.

Zhao, Quiroz, Dixon, and Joshi (2016) investigated English spelling between bilingual and monolingual children in their meta-analysis. It is explained that, “Spelling skills are closely associated with word reading….Bilingual learners who are at risk of reading difficulties often demonstrate some related problems in spelling, but not necessarily more than monolingual learners who are at risk” (p. 196). Zhao et al. (2016) explained that interventions such as phonics instruction, word reading and spelling are more beneficial to struggling English learners than vocabulary and reading comprehension whereas monolingual children showed improvement in reading comprehension but bilingual learners did not.

Genesee (2016) researched the connection between bilingualism and at risk learners and whether dual language programs are effective for these students. Three specific groups were the focus of Genesee’s (2016) research on bilingual children with developmental disabilities: Specific Language Impairment, Autism Spectrum Disorder, and Down Syndrome. Three main
results were found: 1. Bilingual children with developmental disorders did not show unique patterns of challenge compared to monolingual children without disability, therefore, bilingualism did not impact general overall development (Genesee, 2016). 2. As explained by Genesee (2016), “When the performance of bilinguals and monolinguals with the same disabilities was directly compared, simultaneous bilinguals in all three DD groups performed equivalently or better than the monolingual controls, indicating that bilingualism did not put the children at greater risk. The same was found for sequential bilinguals when tested in their dominant language or when both languages were taken into account. However, the second language of sequential bilinguals with DD was often, but not always, poorer than that of monolinguals with DD” (p. 5). 3. Frequency of exposure to language was another key predictor of language development in the developmental disabilities groups (Genesee, 2016). These findings support Genesee’s (2016) conclusion that children at risk for disabilities are able to become bilingual. Further, these students can do well and benefit from participation in a dual language classroom setting (Genesee, 2016).

Baker, Burns, Kame’enui, Smolkowski, and Baker (2016) investigated the use of supplemental instructional in supporting the transition from Spanish to English reading instruction for first grade English learners in their longitudinal randomized control trial study. In support to Genesee (2016), Baker et al. (2016) additionally determined that, “Substantial evidence suggests that Spanish-speaking ELs attending bilingual programs appear to perform as well or better on measures in English as Spanish-speaking ELs attending English only programs. Thus, bilingual instruction appears to be a viable option for students who attend schools prepared to provide strong programs involving native language instruction” (p. 227). Therefore, English learners with and without reading disabilities equally benefit from bilingual instruction.
However, Baker et al. (2016) determined that even reading instruction deemed significantly effective in the first language would be insufficient in meeting the language and literacy proficiency needs in English, therefore, should English language development be neglected, opportunities will be delayed for English learners to build their syntactic and semantic awareness knowledge. A central point in that, “Frequently, ELs in first grade who appear to start below benchmark in the beginning of first grade tend to improve their skills rather quickly after extensive instruction. Thus, students who are below benchmark in the middle of first grade are more likely to be at risk of a reading disability than students who are below benchmark in the beginning of first grade” (Baker et al., 2016, p. 229). Understanding the importance of the first grade benchmark for reading and the connection to bilingual instruction is integral to ensuring that English learners have frequent opportunities to build their foundational English knowledge.

Chua, Soc.Sci, Rickard Liow, Yeong, and Soc.Sci (2016) investigated spelling to assess bilingual kindergarteners, who were native Mandarin speakers, and who were at risk for reading challenges in their exploratory study. According to Chua et al. (2016), “The initial low performance of these children might be due to lack of exposure to spoken English, low socioeconomic status, or delayed development, whereas the reading difficulties or those who continued to have problems after intervention (16% of those identified as at risk) are likely to be a result of long-term cognitive difficulties. Children in this residual group would need more intensive long-term support” (p. 229). Spelling serves as an integral screening tool because it requires complexity and precision, thus leading to effective prediction of risk status for a reading disability (Chua et al., 2016). Key results indicated that reading disability determination was found in the assessments involving spelling, phonological awareness, and rapid naming but
letter identification and vocabulary were not contributing factors for a reading disability (Chua et al., 2016).

Yeung (2018) utilized a growth mixture model study to determine the developmental patterns of English reading in Chinese children in Kindergarten, who spoke Cantonese and were learning English as a second language; she identified cognitive factors of children who were considered to be at risk for a reading disability in English. Similar to Chua et al. (2016), Yeung (2018) described three important cognitive and language foundation areas for L2 reading difficulties: phonological awareness, letter knowledge, and vocabulary; The children were classified into a high-achieving group, a fast-growth group, a slow-growth group, and a low-achieving group. As explained by Yeung (2018), “Class differences in cognitive-linguistic skills showed that, as expected, the low-achieving class who are expected to be at-risk of a reading disability in L2 showed deficits in letter name knowledge, phonemic awareness, receptive and expressive vocabulary. Children with fast growth in English reading over the year did not show any differences in the measured cognitive-linguistic skills as compared to the high achieving class. Those who demonstrated slow growth over the year were significantly weaker than other high-achieving groups in phonemic awareness, receptive vocabulary and expressive vocabulary” (pp. 41-42). Vocabulary is therefore, a highly important focus area in order for English learners to develop proficiency in both receptive and expressive domains. Targeting all foundational language areas will enable English learners opportunities to compare and contrast English to their native language; in addition, English learners will acquire and demonstrate knowledge of the reading process in English and begin the path of second language acquisition.

In regard to identifying children at risk for a reading disability in L2, Yeung (2018) supports Chua et al. (2016) in that, English learners have differing levels of L2 instruction and
use of L2 in their daily lives; therefore, differentiating a reading disability from minimal exposure to L2 is a difficult task (Yeung, 2018). Also, in support to Chua et al. (2016), Yeung’s (2018) results indicate that deficits were seen in phonemic awareness and vocabulary in the children at risk for a reading disability in L2.

**Topic V: Utilizing Assessment to Identify English Learners with Learning Disabilities**

Assessing English learners for a learning disability is a highly complex task and one that requires careful attention. Serpa (2011) discussed discrepancies between how the Commonwealth of Massachusetts serves English learners with learning disabilities and language differences and the Individuals with Disabilities Education Act of 2004. As explained by the U.S. Department of Education (n.d.), “The Individuals with Disabilities Education Act (IDEA) is a law that makes available a free appropriate public education to eligible children with disabilities throughout the nation and ensures special education and related services to those children...Congress reauthorized the IDEA in 2004 and most recently amended the IDEA through Public Law 114-95, the Every Student Succeeds Act, in December 2015.” Understanding the concept of IDEA is integral to understanding how this law is followed or is improperly implemented in the Commonwealth of Massachusetts and ultimately how this law impacts English learners with disabilities.

Serpa (2011) and Huang, Clarke, Milczarski, and Raby (2011) addressed key areas of the educational assessment process that are improperly conducted in the Commonwealth of Massachusetts according to the Individuals with Disabilities Education Act of 2004. The areas of discrepancy are in regard to the variety of assessments used and should not only be tests, assessment is not commonly culturally or linguistically appropriate, assessment is typically given in English and then translated into the student’s native language without validation, and
assessments should be given by qualified personnel (Serpa, 2011). These discrepancies between IDEA 2004 and the Commonwealth of Massachusetts, therefore, potentially significantly impact an English learner’s education, assessment outcomes, special education eligibility, and placement.

Chu and Flores (2011) further addressed assessment procedures of English learners with potential learning disabilities. It is explained that, “It is difficult to distinguish English language learners (ELLs) with learning disabilities (LD) from those who do not have a learning disability because the groups share many of the same characteristics. Among the characteristics shares are poor comprehension, difficulty following directions, syntactical and grammatical errors, and difficulty completing tasks” (p. 244). Educators and specialists can use these characteristics as a guide when working with English learners in the classroom setting to determine if a learning disability may or may not be present. Chu and Flores (2011) addressed that because second language acquisition and learning disabilities are quite similar, “The common characteristics may lead to ‘mistaken identity,’ which can result in typically developing ELLs being diagnosed as having LD and referred for unnecessary special education services” (p. 245). Petersen and Gillam (2013) explained that:

Research has indicated that children who are at risk for reading problems in their early elementary school years often continue to have difficulty reading into adulthood, entailing adverse academic and vocational consequences. The first step in reversing this alarming trend is to develop valid early reading assessment methods that are not culturally and linguistically biased, for it is the early, accurate identification and subsequent prevention of reading difficulty that holds the most promise for reducing the prevalence of reading problems. Unfortunately, most assessment methods are relatively
poor at identifying reading difficulties in culturally and linguistically diverse children. (p. 113)

Proper diagnostic evaluation for a reading impairment in L2, therefore, requires a much more accurate design, including measures to compare proficiency in L1 to proficiency in L2. Without change in current assessment practices of struggling English learners, examiners will continue to have difficulty distinguishing if the child is struggling due to a language difference vs. a learning disability (Serpa, 2001), or accurately predicting reading impairment risk (Petersen & Gillam, 2013).

Similar to Serpa (2011), Chu and Flores (2011) addressed what IDEA 2004 says and how assessment of English learners is typically carried out in schools. When English learners unnecessarily receive special education services, “[their] disproportionate representation in special education makes it difficult for educators to serve the students who do have disabilities” (p. 247). Sullivan (2011) investigated the discrepancy of English learners in special education in U.S. schools. Sullivan (2011) explains that, “A somewhat paradoxical pattern of overrepresentation and underrepresentation seems to exist in the United States, presumably because both underreferral and overdiagnosis occur because of misunderstandings of the educational needs of students identified as ELLs, poorly designed language assessments, and weak psychoeducational assessment practices” (p. 320). All of these factors lead to educational professionals not being able to properly diagnose and refer struggling English learners for accurate intervention.

Huang et al. (2011) supported Serpa (2011) and Chu and Flores (2011) in their point that, “On the whole, our schools are not prepared to deal with the unique challenges faced by ELLs, especially when it comes to appropriately modifying content and assessment to fit their needs” (p.
Serpa (2011) addressed the important fact that, “there is no special licensure for teachers of English Language Learners with disabilities. There is also no licensure for Teachers of Reading who teach ELLs or ELL-SWDs” (p. 4). In regard to teacher education programs, Serpa (2011) explained that, “Colleges and universities in Massachusetts offer a number of accredited teacher education ESL and Special Education programs. However, no Bilingual or Bilingual Special Education or ESL-Special Education degree programs are known to be offered in the Commonwealth, since there is no licensure” (p. 4). Teachers, therefore, are mostly inadequately prepared to work with English learners with disabilities due to the lack of available licensure and preparation programs.

Although licensure is not available, Fernandez and Guzman (2014) provided insight into strategies that can assist teachers in working with English learners who have disabilities in their mixed-methods study involving third and fourth grade Mexican American students. It is explained that, These results support the need for pre-service training to support educators as they serve minority and other at risk students in the public school system. This training should include emphasis on collaborative models to promote student success. These training sessions whether they be pre-professional or school provided in-service training should focus on the measurement and progression of language proficiency, the integration of school programs general, bilingual and special education, general support services that support the basic needs of students, such as school supplies, lunches, essential clothing items and parental support-education” (Fernandez & Guzman, 2014, p. 8). Educators who plan professional development in schools can use this information as a means to providing a strategic focus in assisting classroom teachers working with struggling English learners.
García and Tyler (2010) addressed the challenges that U.S. schools face in fully meeting the academic and language needs of English learners with disabilities. It is explained that, “With the emphasis on accountability for all groups of students… and on providing students with disabilities access to the general education curriculum…, general education teachers are increasingly expected to teach students with very diverse learning needs, and to prepare them for success on high-stakes assessments. Because most ELLs and students with disabilities are held to the same academic standards and take the same statewide assessments as all other students, there is an increased urgency to bring their performance up to levels comparable to their peers’” (García & Tyler, 2010, p. 114). This point is critical because when educators are underprepared in special education, bilingual education, and English as a Second Language due to lack of training and certification programs, meeting the needs of all learners with very diverse cultural backgrounds, linguistic abilities, and academic abilities is a very challenging task (García & Tyler, 2010).

García and Tyler (2010) described the case study of Mrs. Jackson, an eighth grade U.S. History teacher. In her class, she has eight students who have learning disabilities and therefore, receive special education services; of the eight, three are English learners-Osvaldo, Ana and Misha. Osvaldo and Ana receive instruction in English as a Second Language, but Misha was exited from the program the previous year. Kamal, a new student who recently came from Egypt, struggles to keep pace with the class; Mrs. Jackson, therefore, wonders whether he might have a learning disability, but as the general education teacher, she does not feel qualified to make that judgment (García & Tyler, 2010). Although the case study focuses on struggling adolescent English learners, K-12 educators face this challenge; determining the difference between struggle
due to a language difference or a true learning disability is a critical issue and not one that many educators feel equipped to truly understand the differences.

Schools struggle to appropriately meet the learning and language needs of English learners with disabilities due to lack of training opportunities available to teachers. As explained by Huang et al. (2011), “Schools struggle to provide the language assistance these students need, and often must fight to get the extra assistance they need in terms of special accommodation and testing modifications for their LD” (p. 733). Sullivan (2011) addressed the issue that most educational professionals are ill equipped to assess English learners with disabilities. She explains that, “Educational professionals often find it difficult to meet the requirements of special education statues when completing cognitive, academic, and behavioral assessments. Such difficulties arise from the limited array of available instruments in most ELLs’ native languages, professionals’ lack of training in linguistic and cultural differences, and the shortage of bilingual educators and psychologists” (p. 320). When educational professionals are faced with these compounding variables, diagnosing a learning disability vs. a language difference leads to difficulty in properly determining why the English learner is struggling and effective intervention.

Assessment of English learners with disabilities is, therefore, a highly difficult and complex topic and one that leads to challenges between IDEA 2004 and what schools can realistically do when striving to best meet their struggling English learners’ academic and linguistic needs; establishment of a language difference vs. a learning disability is a multifaceted, complex area that leads to struggling English learners being improperly assessed and commonly placed in special education services.
**Topic VI: Supporting English Learners with Reading/Learning Disabilities in the Least Restrictive Environment**

English learners with reading/learning disabilities should be supported in the least restrictive classroom environment. This placement may be the general education setting or it may be a special education placement; regardless, the English learner should be properly supported in a manner that effectively meets his or her academic and linguistic needs. The educational team makes the placement decision based on data provided through a variety of assessments, classroom performance, information provided by classroom teachers and specialists, and observations.

Serpa (2011) specifically addressed the importance of serving struggling English learners in the least restrictive classroom setting. She explains that, “Federal and state laws assure a free and appropriate education in the least restrictive environment for English Language Learners with disabilities (ELL-SWDs). Because of a disability or disabilities ELL-SWDs have a greater need for meaningful access to grade-level academic content through the language they best understand with appropriate supports and related services. The least restrictive language education program for ELL-SWDs is the general education environment along with ELLs with no disabilities” (Serpa, 2011, p. 4). English learners with disabilities fully benefit from learning grade level content alongside their peers because when they receive greater exposure to the English language, they are more likely to acquire increased knowledge in how English is constructed; when struggling English learners are given frequent practice opportunities in the least restrictive environment, they fully benefit from learning the strategies that are also designed to meet the academic and linguistic needs of English learners without disabilities.

Klingner, Boelé, Linan-Thompson, and Rodriguez (2014) further supported the importance of educating struggling English learners in the least restrictive environment in their
position statement. Six important domains are described as essential in meeting the academic, cultural, and linguistic needs of English learners with disabilities:

1. Culturally and linguistically responsive teachers; 2. Culturally and linguistically responsive and relevant instruction; 3. A supportive learning environment; 4. Assistance with English language acquisition (such as oral language, vocabulary, and academic language development) and support with the home language; 5. Help in the general education classroom with accessing the general education curriculum; and 6. Intensive research-based interventions designed to help improve academic and, possibly, behavioral skills in targeted areas. (Klingner et al., 2014, p. 93)

Each of these areas is integral to supporting struggling English learners in the least restrictive environment. The educational team working with English learners who have reading/learning disabilities can use these domains as a means to providing grade level instruction and meaningful access to the general education content. When the team is able to provide instruction that is culturally and linguistically responsive, the struggling English learner will develop a greater understanding of the grade-level content and how the English language is constructed. Allowing the English learner to be fully supported in acquiring the English language and maintaining a close connection to the native language will enable the student to understand similarities and differences between his or her first language and English; provision of research-based practices and strategies will enable the struggling English learner to have greater access to all curricular areas.

Sullivan (2011) also addressed the importance of supporting struggling English learners in the least restrictive environment. Sullivan (2011) specifically discusses the disproportionality of English learners placed in special education. It is explained that, “Not only does
disproportionality exist in special education identification, but in placement decisions, disciplinary consequences, academic performance, and exiting from special education services (Sullivan, 2011, p. 318). This point is highly important because when English learners are improperly placed in special education, they are not receiving services truly designed to meet their academic and linguistic needs.

Sullivan (2011) provided the following important results between the intersection of special education and English as a Second Language: English learners are overrepresented in special education in the disability categories of specific learning disability, speech-language impairment, and mild mental retardation; English learners are underrepresented in special education in the disability category of emotional disability. These categories are, therefore, important to understanding typically which disabilities place English learners in special education.

Fernandez and Guzman (2014) supported Sullivan (2011) regarding English learners are disproportionately placed in special education. Common reasons for referral include challenges with language, reading and writing, and academic success. When these abilities are impacted by these challenges, English learners are typically placed in special education (Fernandez & Guzman, 2014). The disproportionality of English learners placed in special education is highly complex and problematic; effective strategies are needed to assist educators and specialists in determining when referral to special education is appropriate and when their needs can still be met in the general education setting.

Orosco and O’Connor (2014) explored the importance of special education being culturally responsive in their case study describing Mrs. Villa, a bilingual special education teacher who worked with Latino English learners with disabilities. The findings of this study
concluded that three central themes derived: “Cultural Aspects of Teaching Reading, Culturally Relevant Skills-Based Instruction, and Collaborative Agency Time. These themes were interrelated and functioned to create a culturally responsive teaching model” (Orosco & O’Connor, 2014). Mrs. Villa followed this model to best meet her struggling English learners’ academic and linguistic needs the students for two reasons. First, through culturally responsive instruction, the students were given opportunities to increase their reading comprehension skills; second, students increased their confidence in learning and development into successful readers (Anderson & Loughlin, 2014, p. 521). The Individualized Education Programs for her students included instruction in the home language, for these students, in Spanish, as they demonstrated difficulties with reading comprehension (Anderson & Loughlin, 2014, p. 521). Through culturally responsive instruction, the students were able to access their background knowledge, which ultimately led to improved reading comprehension abilities (Anderson & Loughlin, 2014, p. 521). Special education instruction that is built on a culturally responsive foundation, therefore, is integral to struggling English learners’ success with not only acquiring English but also being successful in reading.

The current research, which describes the interrelationships between English as a Second Language and the importance of educating struggling English learners in the least restrictive classroom environment, provides a range of strategies that can be implemented to best meet their cognitive, academic, language, and literacy needs. Educators and specialists can refer to these strategies and utilize and/or modify to fit the needs of elementary and adolescent struggling English learners across grade, subject, and curricular areas.

Rubin (2016) described specific interventions that allow struggling English learners to thrive in the least restrictive classroom setting. Oral reading fluency is described as an integral
component to the reading process, and through frequent practice, the English learner becomes a skilled reader. Rubin (2016) specifically mentions repeated reading to be an effective reading fluency strategy for English learners with and without disabilities. Further, Rubin (2016) explains, “For students with LD, who frequently have great difficulty reading, the use of repeated reading has shown to be highly effective. When focusing on ELL students with LD, the stakes appear to be even higher…Therefore, to assist ELL students with LD to become more fluent and efficient readers, the use of repeated reading can be of great assistance” (p. 35). Rubin (2016) introduced a fluency based reading program and an intervention program with Monica, Orlando, and Antonio, three Spanish-speaking, Mexican-American English learners; Monica and Orlando were in fourth grade and Antonio was in fifth grade. All three students received bilingual education classes and all had a specific learning disability in reading and math (Rubin, 2016). In the fluency based program, the students read from three different sections: phonics, phrases, and stories; in the intervention program, the students read from three different sections: phonics, sight phrases, and oral reading passages/stories (Rubin, 2016). Key results from this non-controlled experiment indicate that Monica, Orlando, and Antonio all made significant progress in phonemic awareness and reading fluency over the course of the year (Rubin, 2016).

Choi, Oh, Yoon, and Hong (2012) researched the strategy Response to Intervention (RTI) for English Language Learners in their literature review. RTI is designed to identify struggling readers, create a school model to focus on literacy development, and implement instructional interventions to assist at-risk students in reading (Choi et al., 2012). RTI has been primarily implemented in elementary schools, but is expanding to use in other disability categories and/or school environments, which includes students for whom English is not their first language (Choi et al., 2012). RTI is described as having three tiers. As explained by Choi et al. (2012), “The
The three-tiered approach relies on core instruction taking place in the general education classroom. If students fail to progress in the general education curriculum, they are progressed to tier 2 where he or she receives supplemental instruction along with the core instruction. If students still fail to progress, they are moved to tier 3 intervention which consists of increased time in the targeted curricular area, a change to another curriculum that State Board of Education adopted, and a lower student to teacher ratio” (p. 2). The purpose of the three-tiered system is to best address each student’s academic needs, provide differentiated instruction, and individualized as needed. RTI supports Serpa (2011), Sullivan (2011), Klingner et al. (2014), and Rubin (2016) in their discussions of the importance of educating struggling English learners in the least restrictive environment. Through the three-tiered approach, all students receive appropriate instruction alongside peers and given additional support as needed. The general education setting was described as the most common least restrictive environment for English learners with and without disabilities by Serpa (2011) and Sullivan (2011). RTI, therefore, is an effective strategy to educate all learners in the least restrictive environment. However, Choi et al. (2012) further explain that, “Before pre-referral, the multidisciplinary team decides if adequate instruction and intervention in the general classrooms are provided for ELLs at risk for reading difficulties before they are referred to special education. If an ELL is still struggling with reading even after sufficient instruction is provided in the general classroom, either additional pre-referral should be provided or a referral process should be conducted” (p. 3). This point addresses the important question, is special education the most appropriate placement for a struggling English learner? The three-tiered RTI model described by Choi et al. (2012) can be implemented to determine if referral to special education if appropriate if the English learner continues to struggle in the general education classroom setting.
Kim and Linan-Thompson (2013) investigated the use of self-regulation as an effective strategy in assisting third grade English learners with disabilities learn science vocabulary. In this multiple-probe study, Erica, Christine, Andrew, and Brain were provided direct vocabulary instruction in the baseline phase, which was followed by intervention and maintenance phases, in which self-regulation strategies were provided. Kim and Linan-Thompson (2013) explain that, “Self-regulation has been used in a variety of contexts and has been effective in increasing the effectiveness of interventions. Self-regulation has been defined as the ability to monitor, assess, and regulate one’s own behavior. Students who learn this skill demonstrate increased academic engagement behaviors and greater attention span during academic activities, thus improving their academic performance” (p. 226). Erica, Christine, Andrew, and Brian utilized self-regulation in their learning of science vocabulary. The wordlist consisted of 102 science words and, “satisfied three criteria. They were (a) at third-grade level, (b) information-oriented…, and (c) important and useful” (Kim and Linan-Thompson, 2013, p. 229). The students’ performance results indicate that, “Despite the high level of intensity, the students showed low levels of acquisition of word meanings when only direct vocabulary instruction was used” (Kim & Linan-Thompson, 2013, p. 233). However, all students agreed that self-regulation was a positive strategy for them (Kim & Linan-Thompson, 2013). The overall results, therefore, provide insight into the effectiveness that self-regulation has on elementary English learners with disabilities when learning academic content; furthermore, self-regulation is a strategy that English learners can use across subject areas to monitor and regulate their understanding of vocabulary.

Anderson and Loughlin (2014) researched the use of classroom drama in English Language Arts classes. Incorporation of drama into English Language Arts lessons allows English learners with and without disabilities to be supported in the least restrictive classroom
setting. Anderson and Loughlin (2014) explain, “…The arts have been recognized as authentic bilingual learning approaches because they encourage ELs to be active as both creators and spectators, who reflect, interact, and respond with their own ideas. The creation of physical and symbolic representations enables ELs to access their prior knowledge of personal and cultural experiences, which supports extended language learning across home and new language forms. These instructional conditions support increased literacy outcomes and engagement among ELs (p. 264).

Anderson and Loughlin (2014) focused their study on third grade students who were native Spanish speakers and learned English as their second language. Second language acquisition is complex and when English learners demonstrate signs of struggle with literacy, strategies that allow for multiple exposure to different facets of language become highly important. Anderson and Loughlin (2014) explain that, “In second-language development, contextualized, interpersonal oral language skills of listening and speaking typically are acquired within an interactive environment with L2 meta-language skills” (p. 266). In support to Serpa (2011), Sullivan (2011), Klingner et al. (2014), and Rubin (2016), providing multiple opportunities to practice listening and speaking in the least restrictive classroom setting, will assist English learners with and without disabilities in their English acquisition skills. Anderson and Loughlin (2014) further explain that, “Notably, ELs convey meaning through the use of specific and complex language features…within a supportive environment in which both home and new languages can be accessed and utilized. Moreover, comprehension of academic language depends significantly upon the knowledge of, and experience with, these linguistic devices” (pp. 266-267). When English learners engage in dramatic readings in English
Language Arts classes, they are given exposure to a variety of linguistic features, thus enhancing their knowledge of how English is constructed.

For English learners with and without disabilities, their academic language is supported by visual and verbal supports (Anderson & Loughlin, 2014). This support, therefore, enables all English learners equal access to differentiated language support as they strive to learn English in the general education classroom setting. The results from Anderson and Loughlin (2014) indicate that when Mr. Beall, English Language Arts teacher, incorporated drama into his lessons, the English learners were more likely to engage in the language and use it for interaction, to question, to critique, and edit/revise their thoughts when working with peers; when compared to a standard English Language Arts class where students did not have as many opportunities to engage with each other or the teacher, they were more focused on comprehending instructional language such as the difference between compare and contrast. Therefore, the results indicate that the incorporation of drama enhances English learners’ linguistic skills and using them for a specific function, purpose, and intent (Anderson & Loughlin, 2014). Drama, therefore, is an effective intervention to support English learners in their knowledge and understanding of English, while at the same time allowing them to learn the intricacies of English in a supportive learning environment.

García and Tyler (2010) further addressed strategies that can be implemented in order to best meet the needs of English learners with disabilities in the least restrictive environment. Strategies addressed are designed to support English learners’ cognitive and academic skills and language and literacy acquisition. Educators and specialists can use these strategies when working with struggling English learners in the classroom environment.
Strategies to support cognitive and academic skills include: utilizing teaching methods that focus on students’ learning preferences or areas of strength (i.e. oral expression vs. written expression), providing assistance with information that students must create by themselves through the use of checklists, study guides, and note-taking assistance, and teaching students effective study skills, skills they can use to self-monitor their comprehension, and coping strategies to support their disabilities (García and Tyler, 2010).

García and Tyler (2010) specifically mentioned the incorporation of Sheltered English instruction in order to support elementary and adolescent English learners’ language and literacy acquisition. Strategies include: providing mini-lessons with focus on review/reinforcement of word meaning, modifying test formats to support needs around language and other disability-related areas, teaching content specific vocabulary and symbols in addition to techniques designed to support technical language and provide greater active engagement with texts, giving students opportunities to build their oral language skills, and involving the reading specialist or special education teacher in the provision of additional, intensive reading intervention (García and Tyler, 2010). Through these strategies, struggling English learners will be provided with appropriate instructional support designed to meet their cognitive and academic and language and literacy needs in the least restrictive classroom environment.

**Topic VII: Supporting Special Education and Teachers of English as a Second Language**

Special education teachers and teachers who teach English as a Second Language need appropriate professional support and research-based strategies in order to best meet the academic, linguistic, and cultural needs of their students. The neuroscience information provides great insight into the language region(s) of the brain that are impacted in a struggling English learner vs. a typically developing English learner. When English learners have a learning disability or
language difference, these educators are put in the role of providing individually-designed interventions to best meet these students’ academic, linguistic, and cultural needs in a variety of classroom settings. Special education teachers and teachers of English as a Second Language need interventions that are research-based in both fields, in order to most effectively and efficiently meet their students’ needs; using the neuroscience information as a guide, educators can design, implement, monitor, and adjust strategies in their work with struggling English learners in a variety of academic settings.

Orosco and Klingner (2010) addressed appropriately supporting educators in meeting the needs of their struggling English learners. It is explained that, “…research should not only investigate the effectiveness of specific instructional approaches but also provide descriptive information about the circumstances under which and with whom a practice is most likely to be successful…Research must be relevant to complex issues that involve culture, language, social interaction, institutions, and cognition” (Orosco & Klingner, 2010, p. 284). Educators need research-based, effective strategies that are designed to support struggling English learners in the general education classroom setting. Due to lack of training and certification opportunities, educators typically do not feel properly equipped to meet these students’ needs; the research needs to delve more deeply into this concern and determine strategies that educators can use when working with struggling English learners in the general education classroom setting which will allow them to most appropriately and effectively design intervention for specific reading skills for English learners with language differences and learning disabilities.

Orosco and Klingner (2010) researched the implementation of the Response to Intervention model (RTI) into an elementary school where a large percentage of Latino English learners, in grades K-2, were struggling with reading. In this case study, it is explained that
Response to Intervention is a support that can be beneficial to English learners when they demonstrate the first signals of struggles with reading (Orosco & Klingner, 2010). Through this three-tiered model, English learners are provided appropriate and individualized support as needed to achieve success in the general education classroom setting.

Eight staff members participated in the study: six teachers (four classroom teachers, one special education teacher, and one reading specialist), one principal, and one school psychologist (Orosco & Klingner, 2010). Although the focus was the analysis of the RTI documents and teacher interviews about RTI and its interpretation, other documents such as classroom materials, literacy-focused lesson plans, and student work were also analyzed (Orosco & Klingner, 2010). Four themes emerged as key findings; according to Orosco and Klingner (2010), the four themes were, “Misalignment in Instruction and Assessment, Negative Schooling Culture, Inadequate Teacher Preparation, and Limited Resources. These themes were intertwined and functioned to create a deficits-based RTI model” (p. 276). These results, therefore, indicate that RTI is a strategy that takes proper training and professional support in order for educators to feel comfortable implementing it in their classrooms in order to assist English learners struggling with literacy skills.

Therefore, although RTI can be an effective strategy to support struggling English learners, educators need proper training, resources, and culturally responsive techniques in regard to assessment and instruction in order for struggling English learners to gain the full benefit of this model.

Rivera, Moughamian, Lesaux, and Francis (2009) addressed the importance of educators being supported in their roles as they strive to meet the needs of their English learners with disabilities. It is explained that, “Ongoing support for building teachers’ capacity to implement
Instructional practices to serve ELLs is as significant a priority as designing effective instructional practices. As more ELLs participate in general education classrooms, teacher preparation programs and professional development agencies must provide experience and knowledge that will enable certified and novice teachers to select and use the most effective practices” (Rivera et al., 2009, p. 30). Professional development that is focused on meeting the academic and language needs of English learners with disabilities is critically important in order for educators to feel supported and effectively prepared to serve these students’ needs.

Rivera et al. (2009) highlighted a variety of strategies designed for educators working with English learners with disabilities. These strategies include the:

- **Response to Intervention Model**
- **Explicit and targeted instruction in the student’s difficulties**
- **Reading Programs** (See Appendix B)
- **Peer-Assisted Learning Strategies (PALS)**
- **Vocabulary-building intervention**
- **Cognitive Strategies/Reciprocal Teaching**
  - Summarize
  - Question
  - Clarify
  - Predict

(Rivera et al., 2009)

Special education teachers and teachers who specialize in English as a Second Language can use these strategies when working with struggling English learners in the least restrictive environment. Educators can utilize this list of strategies when planning interventions for struggling English learners who need assistance with a variety of English reading skills; these
strategies, although mostly designed for small group instruction, can be modified to accommodate individual English learners’ challenges. Special education teachers and teachers who teach English as a Second Language can use the reading programs to best decide which skill(s) their struggling English learners need assistance with and determine the best program to effectively provide skill-based instruction.

The other strategies described can be used to develop small group and individualized instruction for English learners struggling with a variety of reading skills. These strategies will provide English learners with language differences and learning disabilities opportunities to engage with different facets of English: vocabulary, comprehension, and participation in reciprocal teaching through taking on different roles in the group-clarifier, questioner, summarizer, and predictor. These roles will assist struggling English learners in learning different skills that will be useful to understanding and applying academic English across subject areas.

McIntyre, Kyle, Chen, Muñoz, and Beldon (2010) addressed the importance of supporting educators who teach in sheltered instruction classrooms through professional development. The lack of available research-based interventions to properly meet the academic and linguistic needs of struggling English learners was also addressed. McIntyre et al. (2010) researched the use of the Sheltered Instruction Observation Protocol (SIOP) to examine reading achievement of elementary level English learners. The eight facets of the model are: preparation, building background, comprehensible input, strategies, interaction, practice/application, lesson delivery, and review/assessment; this model is described in detail in Appendix C.

The study compared English learners who had received and had not received SIOP instruction; in addition, the study examined how well the 23 participating educators implemented
SIOP during professional development training on this model. The goal was to determine the relationship between SIOP implementation and reading achievement (McIntyre et al., 2010).

A key result of the study was that, “While there were significant achievement differences in classrooms where the model was well-implemented as compared to classroom in which there was no SIOP teaching, the achievement differences come with qualifications” (McIntyre et al., 2010, p. 342). These differences are further explored in regard to the teachers’ overall growth and growth in a specific component. The teachers who demonstrated the most growth, in accordance to the SIOP model, had achieved high scores on the pre-observation or went beyond the project expectations. Specific component growth was seen on the pre-observation, with the highest scores in Building Background and Strategies. Teachers also demonstrated high growth on Comprehensible Input (McIntyre et al., 2010).

Another important result was seen from pre-assessment to post-assessment. The most growth was seen in Building Background, Review, and Preparation (McIntyre et al., 2010). Results indicated that the least growth was observed during the pre-observation in Review and Preparation (McIntyre et al., 2010). Further, results indicated that the students who were instructed according to the SIOP model benefited substantially more those students who did not receive SIOP instruction (McIntyre et al., 2010). These results demonstrate that the SIOP model is, therefore, considered an effective instructional strategy for educators working with English learners in the general education classroom setting.

Through the use of the strategies presented in Orosco and Klingner (2010), Rivera et al., (2009) and McIntyre et al. (2010), special education teachers and teachers who specialize in English as a Second Language will be able to serve their struggling English learners more
effectively both in the general education classroom setting and also in resource room and English and a Second Language specific courses.

**Prevalent Topics and Table**

I present and analyze research throughout this literature review that are primarily centered around the three overarching topics of English as a second language, neuroscience and second language acquisition, and how functional magnetic resonance imaging and voxel-based morphometry can help identify and diagnose an elementary or adolescent English learner who is suspected of having or has a learning/reading disability. The research, which is multifaceted and complex, is summarized and presented in Table I, Appendix A. The reading programs described in Rivera at el. (2009) are presented in Appendix B; the Sheltered Instruction Observation Protocol described in McIntyre et al. (2010) is presented in Appendix C.

**Discussion**

**The Interrelationships between English as a Second Language, Special Education, Reading/Learning Disabilities, and Neuroscience**

There is a positive, correlative relationship between English as a Second Language, special education, an English learner at risk for reading/learning disabilities, and neuroscience. The connections between second language acquisition and typical vs. atypical development is seen in elementary, adolescent, and adult English learners. Neurological imaging allows researchers to understand the impact of second language acquisition on different brain structures and what happens in the brain when an elementary English learner demonstrates signs of struggle with literacy skills in English (L2).
English as a Second Language, Neurological Imaging and L1 and L2 Brain Hemispheric Development

Functional magnetic resonance imaging, magnetic resonance imaging (fMRI), voxel-based morphometry (VBM), skin conductance (SC), and electromyography (EMG) are the most common neurological imaging tests in second language acquisition and special education risk factors according to the research. Archila-Suerte et al. (2015), Yang et al. (2015), Pliatsikas et al. (2014), and Połczyńska et al. (2017) researched the utilization of fMRI in order to attain knowledge of the particular brain regions involved in second language acquisition in adulthood. Grogan et al. (2012) researched the utilization of MRI and VBM in regard to L2 vocabulary acquisition and Baumeister et al. (2017) conducted an EMG/SC study to explore the relationship between vocabulary and emotional memory of the words. Hosada et al.’s (2013) cross-sectional/experimental design study indicated that L2 vocabulary in bilingual adults was predominantly seen in the right hemispheric structures in regard to increased involvement and vocabulary. Although this research is focused on adult learners, elementary English learners additionally experience neural activity in specific regions during second language acquisition.

English as a Second Language, Reading/Learning Disabilities vs. Language Differences, and Neuroscience

Meng et al. (2016) and Girbau-Massana et al. (2014) researched the utilization of fMRI and VBM in making connections between elementary English learners in regard to typical second language acquisition and atypical development in the brain that potentially lead to reading/learning disabilities and determining the difference between a learning disability and a language difference. The volume of gray and white matter in the brain was compared between typical vs. atypical development; the volume became a significantly contributing factor to leading the elementary English learner to appropriately acquire a second language or putting the
child at risk for a reading/learning disability. The neurological imaging enables the researchers to understand the exact brain regions impacted and the influence of gray and white matter present in the child’s brain; therefore, both of these factors are substantial factors in an elementary English learner’s second language development.

**Education Professionals Working with English Learners with and without Learning Disabilities: Integral Factors that Influence Instructional and Placement Decisions**


The research explained the disproportionality of English learners in special education and why this placement occurs. In addition, the research explored the importance of assessment in properly determining the best placement for a struggling English learner; however, current assessment practices make determining the difference between a language difference and a learning disability difficult. The research explored a variety of potential risk factors that lead an elementary English learner to struggle with literacy skills in L2; educators and specialists can use the Language Differences vs. Learning Disabilities Assessment Model presented in Serpa (2005) as a guide to understanding these terms and key factors to understand when working with struggling English learners.

The current model of teacher preparation, as explored in the research, does not adequately prepare educators to work with struggling English learners. Educators, therefore, do
not feel equipped with knowledge of typical second language acquisition development and understanding how it is different from a learning disability. As a result, many struggling English learners are placed in special education; as explained in the research, this placement might not be the most appropriate. As highlighted in the research, the least restrictive classroom setting is the most appropriate placement for struggling English learners.

**Interventions and Strategies for Educators and Education Professionals to Best Meet Struggling and Typically Developing English Learners’ Academic and Linguistic Needs**

K-12 educators and education specialists working with English learners with and without learning disabilities require classroom support, professional development, and appropriate strategies that can be used to meet each English learner’s academic and linguistic needs in the least restrictive classroom environment, most often, general education. Although the research is designed to support educators, parents/guardians can equally benefit from the information as they work with their child(ren) at home. Orosco and O’Connor (2014) explained that the placement and interventions utilized should be culturally sensitive.

Orosco and Klingner (2010) and Choi et al. (2012) specifically mentioned the importance of the Response to Intervention model in meeting these needs through the three-tiered approach. Rivera et al. (2009) highlighted a variety of strategies that classroom teachers and specialists can utilize when working with struggling English learners on literacy skills. McIntyre et al. (2010) focused on the importance of professional development in assisting educators and specialists to meet the learning and language needs of all English learners. Kim and Linan-Thompson (2013) explored the utilization of self-regulation in vocabulary acquisition. Rubin (2016) highlighted repeated reading as an effective strategy. García and Tyler (2010) explored the utilization of Sheltered English Instruction as a means to educating all English learners. Anderson and
Loughlin (2014) researched the incorporation of drama into English lessons to reach English learners.

The range of strategies and interventions provided in the research, therefore, enables educators feel supported, collaborate, especially between general education, special education, and English as a Second Language teachers, and acquire a greater understanding of the current research and research-based effective practices through professional development topics.

**Limitations**

This literature review has several limitations that the author would like readers to consider. First, the current research discussing the multifaceted relationships between English as a Second Language, English as a Second Language and an elementary English learner’s potential risk factors for a reading disability in English, and neuroscience is quite limited in scope. More research is critically needed in the relationship between what the current research says about neuroscience and educational implications and instructional techniques. Thus, there is an important gap in the research that requires further exploration. Second, more research needs to be conducted in regard to why the majority of teacher preparation programs in the U.S. do not provide certification or training in bilingual special education. With schools becoming more and more diverse, all K-12 educators need to feel adequately prepared to teach English learners with and without learning disabilities in the least restrictive environment, which most often is in the general education classroom setting. Third, more research is required in bridging the fields of special education and English as a Second Language. Current assessment practices need to be studied further in order to make changes that will provide struggling English learners with improved assessments truly designed to determine the difference between a language difference and a learning disability. In addition, special education and English as a Second Language
teachers need better information regarding interpreting the assessment results of a struggling English learner in order to accurately recommend the best placement. Fourth, the neuroscientific information needs to be studied further in regard to elementary and adolescent English learners demonstrating typical and atypical second language development; this information needs to be translated into language K-12 educators and education specialists can understand so that they are best equipped to meet the academic, linguistic, and cultural needs of all English learners and can more readily recognize early signs of struggle with second language acquisition. Using the neuroscientific research as a guide, interventions can be created that are designed to meet a particular area of struggle with second language acquisition. Lastly, more research is critically needed in regard to supporting K-12 educators, education specialists, and parents/guardians working with struggling English learners in the classroom and home settings.

The limitations of the current research are critical to understanding the intersection between English as a Second Language, special education, potential risk factors for a reading disability, and neuroscience. There are multiple gray areas between determining the difference between a language difference and a learning disability; therefore, special education and English as a Second Language teachers need better assessments and strategies truly designed to meet the needs of a struggling English learner. In order for K-12 educators and education professionals to fully support struggling English learners, they need appropriate resources and training. When special education and English as a Second Language teachers have the resources they need, and proper training, these educators are better equipped to support general education teachers in meeting the academic, linguistic, and cultural needs of all English learners. In turn, these professionals are better equipped to assist parents/guardians in providing academic and language help in the home.
The limitations of the current research, therefore, are highly important in understanding current K-12 instructional practices for English learners, struggling English learners being overreferred for special education services, the limitations of current assessment practices of English learners, and most educators feeling inadequately prepared to work with struggling English learners in the general education classroom setting.

**Conclusion**

Although the number of studies focusing on English learners with and without disabilities and neuroscience is growing, identification, proper formal and informal assessment practices, and supporting educators and English learners, remain unclear. As a result, distinguishing the difference between a language difference and a learning disability remains a challenging task for K-12 educators, especially for special education and English as a Second Language teachers. This literature review concludes that there are clear parallels between elementary, adolescent, and adult English learners in regard to neuroscience research and neurological imaging. Through the imaging, researchers can determine specific brain structures involved in typical vs. atypical second language acquisition. In addition, K-12 educators and specialists can use the neuroscience information to understand potential risk factors in elementary English learners that might lead to a reading disability in English.

The research explained a variety of interventions and strategies for educators and education professionals to try when working with all English learners, but particularly struggling English learners, in the general education classroom setting. However, teachers need more opportunities for training and professional development in order to advance their own knowledge of English as a Second Language in order to be better prepared to identify when an English learner is struggling and exhibiting possible signs of a learning disability vs. a language
difference. To this end, the research explained that struggling English learners are commonly referred for special education services. Special education and English as a Second Language teachers require more appropriate formal and informal assessment practices and information about best practices for educating a struggling English learner in order to be in a better position to determine when special education is an appropriate placement and when the English learner can best be serviced in the general education classroom setting.

Additional research is critically needed in regard to bringing together English as a Second Language, special education, and neuroscience. More longitudinal studies are needed that follow struggling elementary English learners through adolescence in order to demonstrate that interventions and services allow for adequate progress in U.S. schools. Additional mixed-methods studies are needed that bridge English as a Second Language and special education in regard to meeting the academic, linguistic, and cultural needs of struggling English learners in the least restrictive environment.

Further research is highly needed in bridging the integral relationship between neuroscience and K-12 English as a Second Language. Through the research, special education and English as a Second Language teachers can use the neurological imaging information to better understand the intricacies of second language acquisition; therefore, they are better positioned to provide early intervention when an English learner is exhibiting beginning signs of struggle acquiring and demonstrating knowledge of English.
References


García, S. B., & Tyler, B. J. (2010). Meeting the needs of English language learners with learning disabilities in the general curriculum. *Theory Into Practice, 49*, 113-120. doi: 10.1080/00405841003626585


Serpa, M. B. (2011). An imperative for change: Bridging special and language learning education for ensure a free and appropriate education in the least restrictive environment
for ELLs with disabilities in Massachusetts. *Gastón Institute Publications*. Retrieved from [http://scholarworks.umb.edu/gaston_pubs/152](http://scholarworks.umb.edu/gaston_pubs/152)


Appendix A

Table I: Summaries of Articles

<table>
<thead>
<tr>
<th>Study</th>
<th>Research Design</th>
<th>Participants/Setting</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anderson &amp; Loughlin (2014)</td>
<td>Journal Article</td>
<td>Mr. Beall’s class-18 students, provided the language samples</td>
<td>Based on the SALT-R:</td>
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<tr>
<td></td>
<td>Arts-Based Research</td>
<td>• 8 boys</td>
<td>• Three comparison points emerged:</td>
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<td></td>
<td></td>
<td>• 10 girls</td>
<td>1. “Teacher language in teacher-directed conventional and drama contexts</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Spanish was L1, English was L2</td>
<td>2. Student language in teacher-directed conventional and drama contexts</td>
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<tr>
<td></td>
<td></td>
<td>Mr. Beall was a 2nd year teacher in the English language learning program</td>
<td>3. Student language in student-directed conventional and drama contexts</td>
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<tr>
<td></td>
<td></td>
<td>• Used drama in his teaching of ELA, science, and social studies</td>
<td>(Anderson &amp; Loughlin, 2014, p. 273)</td>
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<tr>
<td></td>
<td></td>
<td>• Certified in both elementary education and English as a Second Language</td>
<td>• Teacher Language:</td>
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<td></td>
<td></td>
<td>• He was concerned about his students’ English literacy skills, particularly specific</td>
<td>• Mr. Beall used an equal amount of English both in conventional and drama</td>
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<td></td>
<td></td>
<td>vocabulary usage and syntax during discussions.</td>
<td>lessons.</td>
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<tr>
<td></td>
<td></td>
<td>• During drama lessons, Mr. Beall produced more speech such as who, what, where, and</td>
<td>• Mr. Beall used a comparable rate and variety of language features during</td>
</tr>
<tr>
<td></td>
<td></td>
<td>when questions. In turn, students were given more opportunities and prompts, that</td>
<td>teacher-directed lessons.</td>
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<tr>
<td></td>
<td></td>
<td>challenged them to use language that was elaborative and descriptive.</td>
<td>• During conventional lessons, Mr. Beall produced more language that was</td>
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<td></td>
<td></td>
<td></td>
<td>more regulated and not directly connected to the lesson, such as using</td>
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<td></td>
<td>attention-getting words directed towards students who were not engaged.</td>
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<td></td>
<td></td>
<td></td>
<td>• Student Language:</td>
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<td></td>
<td></td>
<td></td>
<td>• Student-directed drama afforded students the most linguistically</td>
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<td>productive opportunities:</td>
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<td></td>
<td></td>
<td></td>
<td>• Elaborative language</td>
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<td></td>
<td></td>
<td></td>
<td>• Descriptive language</td>
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</tbody>
</table>

(Anderson & Loughlin, 2014, p. 273)
<table>
<thead>
<tr>
<th>Archila-Suerte et al. (2015)</th>
<th>fMRI Study</th>
<th>82 participants: 66 Spanish-English bilingual (further divided into early and late), 16 English monolinguals</th>
<th>Metacognitive language</th>
</tr>
</thead>
<tbody>
<tr>
<td>The neural response to second language speech processing acted was directly impacted by the age of second language development.</td>
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</table>

<table>
<thead>
<tr>
<th>Baker et al. (2016)</th>
<th>Quantitative Research</th>
<th>The study took place at treatment schools in the Pacific Northwest. In the larger study, eight treatment schools participated; in this study, seven treatment schools participated.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Schools:</strong> All participating schools received Title I services and their students had similar demographic backgrounds.</td>
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<tr>
<td><strong>Teachers:</strong> Three certified teachers and 11 instructional assistants provided the small group instruction. In the treatment and comparison conditions, the instructors were already working with struggling English learners. The teachers were all bilingual and focused on their assigned condition throughout the study.</td>
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<tr>
<td><strong>Students:</strong> All students were Hispanic and all spoke Spanish as their first language; this was determined by a home survey that parents completed. All students received Title I services.</td>
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<tr>
<td>- Average age was 6.5 years</td>
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<tr>
<td>- 42% of the sample group was female</td>
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</table>

**Pretest Differences:**
- The two conditions were not statistically significant in regard to differences.

**Posttest Differences:**
- No significant differences by condition were found on the DIBELS ORF, SAT-10 word reading and sentence reading, Depth of Vocabulary Knowledge, and the transition assessment.
- No significant differences by condition were found on the GRADE listening comprehension and the SAT-10 reading comprehension.
- Language proficiency influenced reading and listening comprehension.

**Feasibility Survey:**
- Teachers in the treatment condition moderately closely followed the script.
- 6-7 teachers felt that the lessons were not at all different from their current daily instruction.
- Most teachers were moderately likely to continue using the transition lessons post research project.
- 4 of the 7 teachers felt that the transition lessons were moderately useful in improving language proficiency.
- Three of the 7 teachers felt that the transition lessons were very useful.
  - Four of the 7 teachers felt that students best responded during the read-aloud section.
  - Three of the 7 teachers felt that students best responded during the vocabulary section.
<table>
<thead>
<tr>
<th>Study</th>
<th>Type</th>
<th>Measures</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baumeister et al. (2017)</td>
<td>Journal Article</td>
<td>Language Experience and Proficiency Questionnaire (LEAP-Q), Positive and Negative Affect Schedules (PANAS), Electromyography/Skin Conductance</td>
<td>32 bilingual English/Spanish speakers</td>
</tr>
</tbody>
</table>

- Results from both the EMG and SC indicate that L2 words are less emotionally involved than L1 words.
- Second language acquisition during adulthood might not involve the same emotional linguistic foundation as learning an L1 during childhood.
- Participants more easily categorized L1 vs. L2 words. However, due to interference, fluency in L2 might be decreased.

<table>
<thead>
<tr>
<th>Study</th>
<th>Type</th>
<th>Measures</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Choi et al. (2012)</td>
<td>Journal Article</td>
<td>Literature Review</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**Response to Intervention Features for English Language Learners:**
- There are relatively few studies which address literacy intervention for English Language Learners who are at risk for reading disabilities.
- Sixteen studies assessed the effectiveness of literacy intervention for ELLs in grades K-2, 1 study for secondary ELLs, and 1 study for grades 2-8.
- Fifteen studies discussed Tiers 1 and 2 early literacy intervention, 1 study discussed additional Tier 1 instruction, 1 study assessed the effects of Tiers 2 and 3 literacy intervention.
- One study: Investigation of the effect of Early Reading Intervention for kindergarten and first grade ELLs.
- One study: Investigation of differential effects of an individualized and small-group reading fluency intervention.
- Four articles assessed the effectiveness of early intervention for ELLs in primary grades with particular reading programs that focus on foundational early literacy skills.

**Response to Intervention Model and English Language Learners:**
- Themes:
  - Effective strategies and instructional techniques for utilization of RTI with ELLs.
  - Language support activities.
  - Recommendations for teachers’ roles.
### Response to Intervention Procedural Suggestions:
- Instruction in general education
- Progress monitoring assessments
- Reading intervention quality

### Response to Intervention Professional Development:
- Peer-Assisted Learning Strategies (PALS) for first grade ELLs on reading
- Learning Disabilities Research Program training for special education teachers

### Response to Intervention: Culture
- Cultural diversity is small focus
- Socioeconomic status
- RTI in Spanish vs. RTI in more than one language

<table>
<thead>
<tr>
<th>Study</th>
<th>Type</th>
<th>Description</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chua et al. (2016)</td>
<td>Exploratory Research Study</td>
<td>138 Chinese children from five government-funded kindergartens participated in the study, which lasted 6 months, with parental permission. Missing data occurred for 11 children so final analysis was based on 127 participants. 127 participants: -60 English as L1, Mandarin as L2 -67 Mandarin as L1, English as L2 Study looked at spelling and phonological awareness</td>
<td>At Time 2, children who spoke English as the first language and Mandarin as the first language showed substantial differences on the outcome; reading disability determination was based on the Wide Range Achievement Test-4 with their own first language group. Children who received a score lower than the 25th percentile in their first language on the outcome measure six months later, were considered to have a reading disability.</td>
</tr>
<tr>
<td>Chu &amp; Flores (2011)</td>
<td>Literature Review</td>
<td>N/A</td>
<td>Appropriate assessment must be utilized to identify English learners with learning disabilities. English learners are disproportionately represented in special education, therefore, making it more difficult for educators to teach students who have documented disabilities.</td>
</tr>
</tbody>
</table>
Fernandez & Guzman (2014) Journal Article

**Mixed-Methods Study**

- San Antonio, TX Metropolitan area
- Two school districts
- Nine elementary schools
- Students
- Families
- Educational teams
  - 13 teams
  - 23 student records

**Student Learning Outcomes:**
- 95% of the time students received A’s, B’s, and C’s in the curriculum
- 55% of the time the standard was met for high stakes reading scores
- 80% of the time students went to the next grade

**Team Decisions and Student Learning Outcomes:**
- Team decisions were tied to a typical to stronger than the typical connection with GPA, attainment of high stakes reading, and moving to the next grade.

**Rates of Language Match:**
- The recommendations set forth by the Language Proficiency Assessment Committee were not always followed.

**Educational Team Members:**
- Standard attendance at meetings was 1-9
- Classroom teacher: general, ESL, special education
- Speech-language pathologist
- Parent and administrator

“Met for:
- Annual reviews
- Tri-annual
- Meeting for a particular purpose
- Parent, teacher, student team study
- ARD
- Pre-referral teams
- Coordinate services
- Discuss student promotion”

(Fernandez & Guzman, 2014, p. 6)

- Met to share and report on results regarding student performance

**Rate of Using Language Recommended by Language Assistance Proficiency Committee:**
- 22-57%: rate of language match was noted
- 9%-35%: rate of language not recorded

**Other Factors that Clarify Team Practices and Student Outcomes:**
- Although grade level and pre-referral team were meeting and practiced research-based practices, they were unable to attain professional reports and
student records. Ultimately this impacted team functioning and student success.

- Bilingual models need clarification:
  - Language proficiency measurement
  - Proficiency re-assessment

- No formal recommendation for students who speak non-standard English

- Transition process: bilingual to English instruction needs clarification

- Additional bilingual staff members needed

- Support services are important

- Principal contact: Student success

- Provision of family needs and supplies: School success

- Weekly teacher meetings and professional expertise: success

- Least restrictive environment as much as possible

- Want to avoid bilingual learners in special education and speech services: prevent over-identification.

<table>
<thead>
<tr>
<th>Garcia &amp; Tyler (2010) Journal Article</th>
<th>Qualitative Research Case Study</th>
<th>Mrs. Jackson, general education content teacher</th>
<th>Special education teachers and English as a Second Language teachers should form a collaborative relationship.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Qualitative Research Case Study</td>
<td>Misha and Kamal (students)</td>
<td>Instruction should be consistent across content areas, between teaching staff, and learning environments.</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>Teachers can consider specific strategies to support content instruction.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Teachers should be aware of potential barriers to learning: reading levels, unfamiliar words and concepts, English terminology, and oral, written, and nonverbal expression.</td>
</tr>
<tr>
<td>Study Details</td>
<td>N/A</td>
<td>N/A</td>
<td>Contextual Information</td>
</tr>
<tr>
<td>--------------</td>
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<td>------------------------</td>
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<tr>
<td>Genesee</td>
<td>N/A</td>
<td>N/A</td>
<td>Colorín Colorado (2017) is a website specifically designed for educators and families that addresses topics pertaining to English Language Learners. In this article, Genesee (2016) discusses the multifaceted relationship between bilingualism and English Language Learners potentially being at risk for a disability-learning, developmental. Throughout the article, Genesee (2016) addresses research pertaining to typical developing monolingual students with the same disabilities as their bilingual peers and how the results reflect similar risk factors.</td>
</tr>
</tbody>
</table>
| Girbau-Massana et al. | Voxel-based Morphometry Study | 10 children with specific language impairment (SLI)  
- 6 of the 10 with SLI also had RD  
- 14 age-matched children with typical language development (TLD) | Gray Matter Volume  
- Children with SLI showed a substantially smaller gray matter volume compared to the children with TLD  
- Children with SLI exhibited a substantially smaller volume of gray matter in three regions:  
  - Right postcentral parietal  
  - Right medial occipital gyri  
  - Left medial occipital gyri  
- Children with SLI exhibited a significantly greater volume of gray matter in the right superior occipital gyrus.  
  
White Matter Volume  
- Children with SLI did not show any substantial differences in white matter volume  
- Children with SLI did not exhibit any particular brain region differences for white matter  

Cerebrospinal Fluid Volume  
- Children with SLI exhibited substantially increased CSF volume than children with TLD  
  
$CFV +RD$.  
- Children, overall, exhibited a substantially lower volume of gray matter in the right postcentral parietal gyrus than children with TLD  
- Children did not demonstrate a substantial difference in white matter |
<table>
<thead>
<tr>
<th>Authors</th>
<th>Study Type</th>
<th>Participants</th>
<th>Findings</th>
</tr>
</thead>
</table>
| Grogan et al. (2012)    | Journal Article                     | Structural MRI and Voxel-based Morphometry Study 61, right-handed non-native English speakers who were 18-29, living in the United Kingdom | - The density of grey matter was higher in multilingual speakers vs. bilingual speakers.  
- Bilingual speakers showed positive correlation between grey matter in the inferior frontal lobe and second language lexical efficiency.  
- There was a negative correlation between age of second language acquisition and grey matter. |
| Hosada et al. (2013)    | Journal Article                     | Experimental Design/Cross-Sectional Study 137 native adult Japanese speakers, low to high English bilinguals | - There was a positive correlation between right hemispheric structures in the inferior frontal lobe and competence in L2 vocabulary. |
| Huang et al. (2011)     | Journal Article                     | Research Report N/A                                                          | - Educational professionals often are not well-prepared to assess ESL students who may also have a learning disability.  
- It is difficult to identify students who truly both have a learning disability and are learning English.  
- Questions arise as to the validity and fairness of assessments due to lack of background knowledge and non-equivalency of translation from L1 to English. |
| Kim & Linan-Thompson    | Journal Article                     | Multiple Probe Across Subjects Study 4 Third Grade Students:  
- Erica  
- Christine  
- Andrew  
- Brian | - Self-regulation had a positive effect on acquiring content-area word knowledge.  
- Student interviews illustrated that self-regulation was positive and helpful in understanding vocabulary. |
| Klingner et al. (2014)  | Position Paper                      | N/A                                                                          | Klingner, Boelé, Linan-Thompson, and Rodriguez (2014) discuss the critically important domains of bilingual special education. This article serves as the Position Statement of the Division for Learning Disabilities of the Council for Exceptional Children. Klingner et al. (2014) divide the domains into six overarching important features that apply to bilingual special education:  
1. "Culturally and Linguistically Responsive Teachers" |
<table>
<thead>
<tr>
<th>McIntyre et al. (2010)</th>
<th>Mixed Methods Study</th>
<th>Teachers’ Overall Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>23 classroom teachers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research Assistant</td>
<td></td>
<td></td>
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<tr>
<td>Project Directors</td>
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</tbody>
</table>

**Culturally and Linguistically Responsive and Relevant Instruction**

**A Supportive Learning Environment**

**Assistance with English Language Acquisition and Support with the Home Language**

**Help in the General Education Classroom with Accessing the General Education Curriculum**

**Intensive Research-based Interventions** (Klingner et al., 2014, p. 93)

Klingner et al. (2014) further describe the importance of collaboration amongst the special education and English as a Second Language teachers in order to support each other in meeting the special education needs of English Language Learners and second language acquisition. The special education, general education, and English as a Second Language teachers can collaborate and support each other in meeting the learning and language needs of English Language Learners with learning disabilities.

**Most improvement was seen in teachers who scored high on the SIOP tool pre-observation or went beyond project expectations and adopted new strategies and reported on them.**

**Specific Component Growth**

- **Pre-observation:**
  - Highest scores on:
    - Building Background
    - Strategies
  - Lowest scores on:
    - Review
    - Preparation

- **Pre-Post Assessment:**
  - Highest growth in:
    - Building Background
    - Review
    - Preparation

- **High growth was seen in:**
  - Comprehensible Input, a new component to teachers

**Student Learning**

- Students instructed by the SIOP model substantially
Meng et al. (2016)  
Journal Article

**Quantitative Research**

- 25 children, selected from 857 children in grades 4, 5, and 6, participated
- 12 children demonstrated reading impairment in English and Chinese
- 13 children had skills typical of a developing reader
- All children spoke Mandarin and lived in China
- None of the children had a medical history of head trauma, injury, or psychiatric disorder
- All participants were right-handed
- All participants had normal or corrected vision

**Chinese Reading Fluency Test and Chinese Written Vocabulary Test**
- Children in the impaired English reading group showed lower achievement on both of these tests.
- Children in the impaired English reading group also showed weak reading skills in Chinese.
- Children in the impaired reading group had an impairment only in English reading skills due to average reading scores in Chinese above the 30th percentile.

**fmri:**

*For children in the typically developing group:*

Increased activation in the following brain regions for rhyme judgement compared to tone discrimination:
- Bilateral temporal lobes
- Bilateral inferior frontal gyrus
- Bilateral precentral gyrus
- Left occipital lobes
- Left supplementary motor area
- Right insula
- Several subcortical areas

*For children in the reading impairment group:*

Increased activation in the following brain regions for rhyme judgement compared to tone discrimination:
- Bilateral temporal lobes
- Left inferior frontal
- Right superior occipital
- Right fusiform
- Left lingual
- Right precentral
- Bilateral insula
- Left supplementary motor areas
- Some subcortical regions

*The typically developing reading group showed significantly increased activation in the following brain regions:*
- Left inferior occipital/fusiform
- Left precentral
- Bilateral superior parietal
- Inferior temporal regions
- Bilateral cerebellum
For children in the reading impairment group, they did not show any increased brain region activity than the typical developing group.

**Overall Results:**
- There is a relationship between brain activity and functional connection in children who speak English as a Second Language in their auditory phonological and behavioral reading skills.
- Both groups showed increased activation in the left superior temporal gyrus compared to the tone discrimination task.
- The children in the reading impairment group, showed reduced activation in the left inferior frontal gyrus and left fusiform gyrus but not in the left superior temporal gyrus.
- The children in both reading groups showed increased activation in the left inferior frontal gyrus and the fusiform gyrus but not the left superior temporal gyrus.
- Children in the typically developing reading group showed substantially higher functional connection between the left superior temporal gyrus and the left fusiform gyrus.

**Important result:** The lack of differences between the typically developing reading group and the reading impairment group in the left superior temporal gyrus indicates for children who speak English as a second language, phonological representation and low-level acoustic processing might be intact in children who speak English as a second language and have a reading impairment.

<table>
<thead>
<tr>
<th>Orosco &amp; O’Connor (2014)</th>
<th>Qualitative Research</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mrs. Villa, bilingual special education teacher at Caesar Chavez Elementary School, part of a large southwestern urban school district.</td>
<td></td>
</tr>
<tr>
<td><strong>Important Background Information:</strong></td>
<td></td>
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<tr>
<td>- 624 students-91% Hispanic-All Latino English Language Learners, 6% African American, 1% White,</td>
<td></td>
</tr>
<tr>
<td>Three themes emerged:</td>
<td></td>
</tr>
<tr>
<td>1. “Cultural aspects of teaching reading”</td>
<td></td>
</tr>
<tr>
<td>2. Culturally relevant skills-based instruction</td>
<td></td>
</tr>
<tr>
<td>3. Collaborative agency time”</td>
<td></td>
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</tbody>
</table>

(Orosco & O’Connor, 2014, p. 520)
<table>
<thead>
<tr>
<th>Study</th>
<th>Type</th>
<th>Findings</th>
<th>Summary</th>
</tr>
</thead>
</table>
| Orosco & Klingner (2010) Journal Article | Qualitative Research | - 1% Asian, 1% Other
- 17% of the Latino English Language Learners were reading at a proficient level. | Four themes emerged:
1. Classroom instruction and assessment practices were misaligned
2. The school culture was considered negative
3. Educators were inadequately prepared to meet English Language Learners cultural and linguistic needs
4. Resources were limited |
| Petersen & Gillam (2013) Journal Article | Longitudinal Study | - 290 students from Mi Piquito de Oro, part of La Esperanza School District, a large, Midwestern, mountain urban school district
- 8% of La Esperanza School District’s English Language Learners were reading at a proficient or above-proficient level
- Mi Piquito de Oro’s population: 14% White, 1% African American/Asian, and 85% Latino.
- 80% of the Latino students were English Language Learners.
- 11% of Mi Piquito de Oro Latino English Language Learners were reading at a proficient level.
- The study took place during the second year of RTI training.
  - 1 special education teacher, 1 reading specialist, 4 classroom teachers, 1 school psychologist, and 1 principal participated
- Not all Kindergarten prediction measures are greatly correlated with first grade reading criteria. Models 1 and 2
- Kindergarten reading criteria greatly correlated with first grade word-level reading and reading comprehension measures; significant results were seen in:
  - DIBELS nonsense first grade word decoding subtest
  - DIBELS oral reading fluency subtest
  - Word Identification
  - Reading Comprehension
- Integration of Kindergarten Spanish reading criteria also
|
resulted in substantially significant results across the four test above.  
*Model 3*

- All four tests showed significant results when determining the extent that the best English or Spanish descriptive measure scores played a role in variance of first grade criterion measures.  
*Model 4*

When determining the extent that English language proficiency and language ability predicted first grade reading measures:

- Nonsignificant results were seen in:  
  - DIBELS nonsense word fluency subtest  
  - DIBELS oral reading fluency subtest

- Significant results were seen in:  
  - Word Identification  
  - Reading Comprehension  
*Model 5*

- Reading-related Spanish measures did not significantly contribute to unique variance in regard to reading-related English reading criteria for first grade reading measures.  
*Model 6*

- Although results were not significant for unique variance in first grade word level reading criteria, unique variance was seen in reading comprehension.

<table>
<thead>
<tr>
<th>Study</th>
<th>Design</th>
<th>Participants</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pliatsikas et al. (2014)</td>
<td>fMRI Study</td>
<td>17 adult Greek-English learners, 22 native English speakers</td>
<td>The fMRI study revealed no significant differences regarding inflection between native and late non-native English speakers.</td>
</tr>
</tbody>
</table>
| Polczyńska et al. (2017)             | fMRI Study              | 25 adult early proficient Spanish-English bilingual patients, 25 adult monolingual speakers | Bilingual patients demonstrated increased activation in the right hemisphere.  
  - Left hemisphere lateralization is highlighted in monolingual speakers. |
| Reiterer et al.  
(2009) |
<table>
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<tr>
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<tbody>
<tr>
<td>Journal Article</td>
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<tr>
<td>EEG Synchronization Study</td>
</tr>
<tr>
<td>2 groups of proficient Austrian German (L1) learners of English as a second language who differed in their English (L2) language performance</td>
</tr>
<tr>
<td>✤ In less fluent, proficient speakers, the right hemisphere was substantially more involved in second language processing.</td>
</tr>
<tr>
<td>✤ The EEG synchronization patterns were most significant in the lower gamma frequency range</td>
</tr>
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</table>

| Rivera et al.  
(2009) |
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<tr>
<th></th>
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<tbody>
<tr>
<td>Professional Practice Article</td>
</tr>
<tr>
<td>N/A</td>
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<tr>
<td>N/A</td>
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</tbody>
</table>

Rivera, Moughamian, Lesaux, & Francis (2009) examine the literature pertaining to English Language Learners and special education in *Language and Reading Interventions for English Language Learners and English Language Learners with Disabilities*. Rivera et al. (2009) provides comprehensive, multifaceted information regarding the following significantly important topics:

1. **Identification and Evaluation of English Language Learners and their Learning Needs:**
   - The role of English proficiency
   - The role of academic achievement
   - Evaluation issues
   - Reading disabilities
   - Identifying English Language Learners with disabilities
   - Important points regarding evaluation

2. **Instructional and interventional Techniques:**
   - Response to Intervention Model
   - Explicit, intensive, targeted
   - Early intervention
   - Peer-assisted learning (PALS)
   - Learning disability focus:
     - Vocabulary
     - Prior knowledge

3. **Instruction and intervention for English Language Learners with learning disabilities in the upper grades:**
   - Cognitive techniques
     - Summarize
     - Question
### Professional Development

- Targeted to assisting teachers in meeting the needs of English Language Learners and English Language Learners with disabilities in general education
- Focus on effective instructional strategies for English Language Learners and English Language Learners with disabilities in general education

Effective instruction for all learners in the classroom

### Three Spanish-speaking Mexican American English Language Learners:

#### Fourth Graders:
- Monica: Age 9
- Orlando: Age 10

#### Fifth Grader:
- Antonio: Age 12

#### Monica:

**Phonics:**
- Significant growth in phonemic awareness and reading fluency
- Started on Probe 1 in Phonics, ended on Probe 19
- Initially pronounced the English “j” like “huh” as in Spanish
- Had difficulty with consonant-vowel sound pattern
- Initially pronounced “si” digraph as “see”

**Phrases:**
- Began at Probe 7 and ended at Probe 15

**Stories:**
- Substantial growth
- Started at Probe 22 (primer reading level)
- Ended at Probe 46 (second grade reading level)

#### Monica’s Overall Performance:

**Intervention Assessment:**
- Improved in both phonemic awareness and fluency
- Increased number of accurately read sounds and phrases on Phonics probe, Pre-Primer Reading probe, and Primary Reading probe
- Her proficiency level was nearing third grade level

**DIBELS Posttest:**
- Quicker and more accurate reading
- Progress in summarizing the text
- Progress in fluency, accuracy, and recall
<table>
<thead>
<tr>
<th>Student</th>
<th>Phonics and Phrases</th>
<th>Stories</th>
<th>Overall Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Orlando:</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Phonics and Phrases:</strong></td>
<td>Started at Probe 3</td>
<td>Initially pronounced the English “j” like “huh” as in Spanish</td>
<td>Progress was seen in phonemic awareness and reading fluency</td>
</tr>
<tr>
<td></td>
<td>Initially he rolled his “r’s” in the Phonics probe</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Initially pronounced the English “j” like “huh” as in Spanish</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Completed 24 probes in Phonics and 17 probes in Phrases</td>
<td></td>
<td></td>
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<tr>
<td><strong>Stories:</strong></td>
<td>Started at Probe 30 (first grade level)</td>
<td>Ended at Probe 51 (nearing third grade level)</td>
<td></td>
</tr>
<tr>
<td><strong>Orlando’s Overall Performance:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Intervention Assessment:</strong></td>
<td>Progress was seen in phonemic awareness and reading fluency</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>DIBELS Posttest:</strong></td>
<td>Progress in reading fluency and accuracy</td>
<td>Slight decrease in performance on story retell but progressed in all other areas</td>
<td></td>
</tr>
<tr>
<td><strong>Antonio:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Phonics:</strong></td>
<td>Started on Probe 3</td>
<td>Ended on Probe 14</td>
<td>Progress in phonemic awareness and reading fluency</td>
</tr>
<tr>
<td></td>
<td>Demonstrated difficulty with phonics overall</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Unable to demonstrate mastery of short vowel sounds by the end of the study</td>
<td></td>
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</tr>
<tr>
<td><strong>Phrases:</strong></td>
<td>Began on Probe 11</td>
<td>Ended on Probe 16</td>
<td>Continued progress was substantial</td>
</tr>
<tr>
<td><strong>Stories:</strong></td>
<td>Began on Probe 35 (second grade reading level)</td>
<td>Ended on Probe 49 (nearing third grade level)</td>
<td></td>
</tr>
<tr>
<td><strong>Antonio’s Overall Performance:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Intervention Assessment:</strong></td>
<td>Progress in phonemic awareness and reading fluency</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>DIBELS Posttest:</strong></td>
<td>Continued progress was substantial</td>
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</table>

Throughout the report, Serpa (2011) provides critical information regarding the laws for English Language Learners with disabilities, assessment procedures for eligibility, laws regarding placement, and the

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Serpa (2011)

*Government Report/Research Report*
requirements for teachers to teach English Language Learners with disabilities. Serpa (2011) also gives a comprehensive list of recommendations at the state and district levels, and addresses the need for further research.

| Serpa (2005) |
| Professional Practice Article |
| N/A |
| N/A |
| Serpa (2005) created *The Language Minority Assessment Project: ELL Assessment for Linguistic Differences vs. Learning Disabilities Project* website as a comprehensive resource for educators and families that explores the multifaceted, under-researched, complex, topic of English Language Learners and special education. The website addresses the broad differences between *linguistic difference vs. learning disability* and how they potentially impact an English Language Learner’s ability to acquire and comprehend the English language. Serpa (2005) provides critical insight into the following domains:
- Assessment Process: *Linguistic Difference vs. Learning Disability*
- Legal and Ethical Requirements
- Linguistics and Culture
- Beginning Point

| Sullivan (2011) |
| Journal Article |
| Quantitative Research |
| U.S. southwestern state which enrolled approximately 1.1 million students |
| ELLs comprised approximately 16% of enrollment |
| Racial minorities comprised 55% of enrollment |
| Latinos were predominant minority group-39% of enrollment |
| 91% of ELLs spoke Spanish |
| 44%+ of all students were eligible for free or reduced-price lunch |
| 8% received special education |
| Special education: |
| • 46% White |
| • 39% Latino |
| There was an increasing trend in the total number of districts that reported data for ELLs |
| 1999: 72% of state’s total student population |
| 2006: over 87% of state’s total student population |
| The trend increased towards English Language Learners in special education |

Patterns of English Language Learners in Special Education:
- Overrepresentation was highest in SLD and MIMR
- Underrepresentation was lowest in ED
- Increased frequency of ELLs in special education was most commonly seen in SLD and SLI

Patterns of English Language Learners Placed in Special Education:
- Approximately 51% spent at least 80% of time in general education
<table>
<thead>
<tr>
<th>Study</th>
<th>Sample Size and Characteristics</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swanson et al. (2017)</td>
<td>- 7% Native American&lt;br&gt;- 7% African American&lt;br&gt;- 1% Asian/Pacific Islander&lt;br&gt;- 450 students in grades 1, 2, and 3 from three large Southwestern school districts: 205 boys and 245 girls&lt;br&gt;- Spanish was the first language of all students</td>
<td>- Less likely to be placed in the least restrictive environment compared to White peers&lt;br&gt;- Less likely than White peers to be removed from general education for most of the school day&lt;br&gt;- Increased representation in spending time in a separate setting.&lt;br&gt;- There were no significant interactions pertaining to the testing waves&lt;br&gt;- Cognitive differences across the ability groups at Wave 1 remained the same across the testing waves&lt;br&gt;- Substantial subgroup differences were mostly due to performance level at Wave 3 but not the rate of growth. Question 1: Working memory better supported the data when they were included in the growth model-related to both L2 passage understanding and word identification. Question 2: Cross-sectional and growth effects in the executive part of working memory were found when reading disability was treated as a contrast variable or continuous variable. Reading disability differences in growth pertained only to the executive part of working memory in English.</td>
</tr>
<tr>
<td>Swanson et al. (2012)</td>
<td>- 383 students in grades 1, 2, and 3 from three large school districts in Southern California. All students were Hispanic. Important Background Information: Reading instruction at school was either in English or a mix of English and Spanish. Phonics was given most emphasis in the reading program in each school district. There were three waves of data Sample group: 14% mainly spoke Spanish and English at home, 6%</td>
<td>- There were no substantial differences across the six subgroups on Spanish: receptive and expressive vocabulary, reading comprehension, naming speed, and random generation. There were no substantial differences among the six subgroups on English: random generation. Question 1: Children who did not have a reading disability performed higher than the children who had a reading disability. Children considered to be bilingual performed higher than children considered English Language Learners.</td>
</tr>
</tbody>
</table>
mainly spoke English at home | deemed at risk for a reading disability appeared in both bilingual and English Language Learner groups.

-Three important findings pertaining to reading subgroups on non-classification:

**Non reading disabled vs. at risk for reading disability**

1.a. Children at risk for a reading disability in comprehension scored higher than the children at risk for a reading disability in word identification and comprehension on the English and Spanish phonological processing skills.

1.b. Children at risk for a reading disability in comprehension scored higher than the children at risk for a reading disability in word identification and comprehension on Spanish: word identification, and working memory. Children at risk for a reading disability in comprehension scored higher than the children at risk for a reading disability in word identification and comprehension on English: naming speed and syntax. Children at risk for a reading disability in comprehension scored higher than the children at risk for a reading disability in word identification and comprehension on classroom inattention.

2. Children who did not have a reading disability scored higher than children at risk for a reading disability in comprehension on inattention only. The children at risk for a reading disability in comprehension scored lower on classification measures of English: word identification, vocabulary and comprehension when compared to children who did not have a reading disability.

**English Language Learners vs. Bilingual**

a. A substantial effect was seen in favor of bilingual children compared to English Language Learners on classification measures of English: receptive and expressive vocabulary.
**b.** Substantial differences were seen in favor of bilingual children than English Language Learners on classification measures of English: word identification, comprehension, phonological processing, and working memory.

c. English Language Learners attained higher inattention ratings in the classroom compared to the bilingual children.

d. There were no substantial differences between English Language Learners and bilingual children on Spanish: reading and cognition.

**Question 2:**

1. Children who have high Spanish vocabulary but low English vocabulary had problems similar to the English Language Learners who were at risk for a reading disability on English: phonological processing, syntax, and naming speed. Also, children who have high Spanish vocabulary but low English vocabulary had problems similar to the English Language Learners who were at risk for a reading disability on Spanish: working memory.

2.a. In regard to performance, English Language Learners who were at risk for reading disabilities, demonstrated deficiencies in verbal working memory when compared to children without a reading disability.

2.b. Children who had high Spanish language skills scored higher on the Spanish word identification tasks compared to children deemed at risk for a reading disability.

**Question 3:**

3. Working memory contributes to a reading disability in English Language Learners. Working memory contributes to acquiring language.

| Yang et al. (2015) | fMRI Study | 39 native English-speaking adults from Penn State University who were learning Chinese | ✤ Successful learners demonstrated a more connected and strengthened multi-path network. ✤ Successful learners showed substantial differences in the |
| Yeung (2018) | Quantitative Research | 184 Chinese ESL children, who spoke Cantonese, participated from 8 kindergartens in Hong Kong: 97 boys and 87 girls | Examination of the high ability group, the fast growth group, and the slow growth group indicated that the fast growth group and the high ability group had similar cognitive-linguistic ability, even though the fast growth group had a beginning lower level of ability of reading in English. Chinese children who were in the slow growth group in English reading and thus, who were at risk for a reading disability in English, showed a decreased level of phonemic awareness, receptive vocabulary, and expressive vocabulary when compared to the high ability group.

| Zhao et al. (2016) | Meta-Analysis | Bilingual vs. monolingual learners | Bilingual vs. monolingual: Lexical spelling, not sub-lexical spelling, was significantly different between bilinguals and monolingual learners. L2 spelling is a function of lexicality. Grade level: Bilingual learners in lower and upper grades performed higher on real-word spelling than monolinguals. As students enter upper grades, real-word spelling performance is similar. At-risk reading: Bilingual learners demonstrated greater performance on real-word spelling than monolingual learners at risk for a reading disability. Bilingual learners who were not at risk for a reading disability might have increased metalinguistic skills in spelling performance. Spelling success is related to reading success. |
Appendix B

Reading Programs

(Rivera et al., 2009)

<table>
<thead>
<tr>
<th>Reading Program</th>
<th>Focus of Program</th>
<th>Group Size</th>
<th>Students’ Ages/Grades</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Read Well</strong></td>
<td>❖ Fluency</td>
<td>Small group</td>
<td>K-2</td>
</tr>
<tr>
<td></td>
<td>❖ Phonics</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>❖ Vocabulary</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Read Naturally</strong></td>
<td>Oral reading fluency</td>
<td>Not specified</td>
<td>K-12</td>
</tr>
<tr>
<td><strong>Reading Mastery</strong></td>
<td>❖ Phonics</td>
<td>Small group</td>
<td>5-14</td>
</tr>
<tr>
<td></td>
<td>❖ Fluency</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>❖ Comprehension</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Corrective Reading</strong></td>
<td>Intensive Instruction in:</td>
<td>Not specified</td>
<td>Grades 4-12</td>
</tr>
<tr>
<td></td>
<td>❖ Decoding</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>❖ Comprehension</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Four levels is provided in both skills)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Students who demonstrate strong decoding skills but weak comprehension will benefit from strategies designed to support:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>❖ Vocabulary</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>❖ Information</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>❖ Comprehension</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Proactive Reading / Proactiva (Spanish)

<table>
<thead>
<tr>
<th>Instructional support is provided in:</th>
<th>Small group</th>
<th>First grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Phonemic Awareness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Orthography</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Word Recognition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Fluency</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Comprehension</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

First grade
Appendix C

The Sheltered Instruction Observation Protocol

(McIntyre et al., 2010)

<table>
<thead>
<tr>
<th>Step</th>
<th>Instructional Information</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Preparation</strong></td>
<td>❖ Writing:</td>
</tr>
<tr>
<td></td>
<td>○ Content objectives</td>
</tr>
<tr>
<td></td>
<td>○ Language objectives</td>
</tr>
<tr>
<td></td>
<td>❖ Determining content based on students’ ages</td>
</tr>
<tr>
<td></td>
<td>❖ Locating additional materials</td>
</tr>
<tr>
<td></td>
<td>❖ Adapting content to meet all English proficiency levels</td>
</tr>
<tr>
<td></td>
<td>❖ Planning meaningful activities designed to integrate lesson content</td>
</tr>
<tr>
<td><strong>Building Background</strong></td>
<td>❖ Directly connecting concepts to students’ backgrounds and experiences</td>
</tr>
<tr>
<td></td>
<td>❖ Directly connecting previously taught and new concepts</td>
</tr>
<tr>
<td></td>
<td>❖ Placing emphasis on new vocabulary</td>
</tr>
<tr>
<td><strong>Comprehensible Input</strong></td>
<td>❖ Utilization of appropriately-leveled speech for students’ levels</td>
</tr>
<tr>
<td></td>
<td>❖ Clearly explaining academic assignments/tasks</td>
</tr>
<tr>
<td></td>
<td>❖ Utilization of a variety of teaching techniques to make content clear</td>
</tr>
<tr>
<td>Strategies</td>
<td>Student-based:</td>
</tr>
<tr>
<td>------------------</td>
<td>----------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>✤ Problem solve</td>
</tr>
<tr>
<td></td>
<td>✤ Predict</td>
</tr>
<tr>
<td></td>
<td>✤ Organize</td>
</tr>
<tr>
<td></td>
<td>✤ Summarize</td>
</tr>
<tr>
<td></td>
<td>✤ Categorize</td>
</tr>
<tr>
<td></td>
<td>✤ Evaluate</td>
</tr>
<tr>
<td></td>
<td>✤ Self-monitor</td>
</tr>
<tr>
<td>Teacher-based:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>✤ Scaffolding strategies</td>
</tr>
<tr>
<td></td>
<td>o Comprehension for:</td>
</tr>
<tr>
<td></td>
<td>o How much support to provide</td>
</tr>
<tr>
<td></td>
<td>o When to back off</td>
</tr>
<tr>
<td></td>
<td>o Types of questions</td>
</tr>
<tr>
<td>Interaction</td>
<td></td>
</tr>
<tr>
<td></td>
<td>✤ Frequent opportunities for academic discussions</td>
</tr>
<tr>
<td></td>
<td>✤ Group sizes that focus on the highest level of</td>
</tr>
<tr>
<td></td>
<td>language development</td>
</tr>
<tr>
<td></td>
<td>✤ Appropriate wait time</td>
</tr>
<tr>
<td></td>
<td>✤ Multiple opportunities for students to clarify</td>
</tr>
<tr>
<td></td>
<td>major concepts</td>
</tr>
<tr>
<td></td>
<td>✤ Hand-on materials are provided</td>
</tr>
</tbody>
</table>
| **Practice/Application** | - Activities that allow for real life application of information and skills  
- Integration of reading, writing, listening, and speaking |
| **Lesson Delivery** | - Maximum student engagement  
- Appropriate pacing  
- Content and language objectives are addressed |
| **Review/Assessment** | - Thorough review of important vocabulary  
- Provision of feedback  
- Carrying out assessments that address comprehension on all objectives |