

A QUANTITATIVE STUDY ON THIRD-GRADE EDUCATORS' PERCEPTIONS OF  
BRAIN-BASED LEARNING BASED ON GENDER AND TITLE I FUNDING

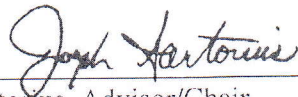
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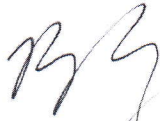
A QUANTITATIVE STUDY ON THIRD-GRADE EDUCATORS' PERCEPTIONS OF  
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Presented by Diana Hsu a candidate for the degree of Doctor of Education and hereby certify that in their opinion it is worthy of acceptance.



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A Dissertation  
Presented to  
The Faculty of the Graduate Education Department  
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In Partial Fulfillment  
Of the Requirements for the Degree

Doctor of Education

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By

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## **ABSTRACT**

Brain-Based Learning is one of the many strategies which educators utilize when teaching. Prior research conducted over Brain-based Learning has demonstrated a difference between how students learn based on the gender of the student. Additionally, prior studies have been performed over perceptions of Brain-Based Learning. However, the researcher was unable to find studies conducted which delve into the perceptions of third-grade educators utilizing Brain-Based Learning in the classroom to determine how the educator's gender or whether the school is Title I or non-Title I funded affect perceptions. Through the use of a state-wide survey, this study investigated the perceptions of Missouri third-grade educators regarding Brain-Based Learning. The purpose of this quantitative research was focused on third-grade educator's perceptions of Brain-Based Learning and how gender and Title I funding influenced perceptions by utilizing the Brain-Based Learning Survey Questionnaire (BBLSQ). Findings indicated there is an effect with third-grade educator's gender, based upon female educator's higher perceptions of Brain-Based Learning. The goal of this study was to help educators in the field of education gain an understanding of how the brain functions and the differences between the male and female brain. The study was conducted to help administration provide opportunities for teachers to participate in Brain-Based Learning, but also actively motivate students to take ownership in their own learning as well.

# **CHAPTER ONE**

## **INTRODUCTION**

Gender differences exist in various aspects of teaching (Haroun et al., 2016), but one rarely explored aspect is the differences between how male and female educators teach students. Few, if any, studies share information about whether gender or Title I funding may impact teacher perception in regard to Brain-Based Learning and literacy. According to Jensen (2005), the concept of Brain-Based Learning is based on principles which were developed to understand how the brain works and learns. These principles are then utilized to develop strategies based on the body, mind, and brain research (Jensen, 2005). A number of studies share qualities of effective teachers, which are described by Stronge (2018) as: flexibility, management, caring, passion to work with children, and believing all students can learn.

In examining literacy, third-grade students are a pivotal study group. During the first few years of schooling, students are learning to read, and after third-grade students read to learn. Buehler and Guignard (2019) describe a critical change in students' relationship to reading occurs at the end of third-grade. However, Buehler and Guignard (2019) found about 67% of children nationwide are not proficient readers by the end of third-grade. Buehler and Guignard (2019) stated, students who read at grade level by the end of third-grade are four times as likely to graduate from high school on time. Additionally, students who read at grade level at the end of third-grade are more likely to succeed in later grades and also able to master complex subjects.

In Chapter One, the researcher presents the problem statement regarding Brain-Based Learning, literacy research, and Title I. The study explores third-grade teachers'

perceptions of Brain-Based Learning instruction and how it relates to literacy and Title I. The study also sought to determine if Title I funding impacted the perceptions of third-grade educators utilizing Brain-Based Learning. The theoretical framework of the study is based on Eric Jensen's work on Brain-Based Learning (Jensen, 2005). Additionally, in Chapter One details the purpose of the study as well as an explanation of the research questions which were used to determine the perceptions of the third-grade educators utilizing Brain-Based Learning through the implementation of the Brain-Based Learning Survey Questionnaire (BBLSQ) (Klinek, 2009). Furthermore, the origin of Title I, the purpose of Title I funds, and how funding impacts schools in the state of Missouri will be analyzed in detail. Lastly, other components including the null hypothesis, limitation/delimitations, assumptions, design controls, and key terms are addressed in the chapter.

### **Problem Statement**

Drawing from Jensen's (2005) Brain-Based Learning Theory, the study sought to determine the differences of perceptions of third-grade male and female educators using Brain-Based Learning. The study was conducted to determine if any differences in the perceptions between male and female educators implementing Brain-Based Learning in their classroom existed. Currently, the researcher was unable to find studies which explore the differences in perceptions of male and female educators implementing Brain-Based Learning practices.

A psychologist named Carol Dweck (2016) developed growth mindset for schools and educators. Growth mindset is the perception an individual can grow their abilities, such as literacy, through hard work and dedication (Dweck, 2016). Growth mindset can

affect learning, professional success, and other dimensions of life (Dweck, 2016). A teacher's lack of growth mindset and unconscious biases could affect an educator's perception about the effectiveness of Brain-Based Learning. Additionally, if students have a growth mindset, students can develop positive intellectual abilities and further their learning (Boaler, Dieckmann, Preq-Nunez, Sun, & Williams, 2018; Claro, Paunesku, & Dweck, 2016. Claro, Paunesku, and Dweck (2016) explored how growth mindset may impact the academic achievement through the examination of 1,500 study participants in Chile which revealed despite the background of each participant if a growth mindset was present, individuals will be able to improve academically. A growth mindset can help all people to be successful no matter their background or circumstances present in their life (Dweck, 2016).

Although there was available research about Brain-Based Learning techniques in elementary schools, there was a lack of research specifically concentrated on the perceptions of educators working in Title I or non-Title I schools who teach using Brain-Based Learning. The study leveraged Jensen's (2005) Brain-Based Learning to determine the differences of perceptions of educators teaching in schools with or without Title I funding using Brain-Based Learning. The study was conducted to determine if any differences in the perceptions between educators who work in Title I or non-Title I schools implementing Brain-Based Learning in their classroom existed. There was no information discovered about how Brain-Based Learning was affected by Title I funding or non-title I funding.

The researcher took the lens of Eric Jensen's Brain-Based Learning framework and using Klinek's (2009) Brain-Based Learning Survey Questionnaire, surveyed third-

grade male and female teachers to understand their perceptions about Brain-Based Learning. Participants of the study were teachers in Missouri public schools implementing Brain-Based Learning models.

### **Theoretical Framework**

Jensen's (2005) work on Brain-Based Learning Theory provides the theoretical framework for this study. Brain-Based Learning Theory posits students learn differently so a variety of tools for learning should be encouraged and utilized (Jensen, 2005). Brain-Based Learning Theory is based on the latest scientific research about how the brain works then applying the understanding to learning strategies, including cognitive development and how students learn differently as they age, grow, mature socially, emotionally, and cognitively (Jensen, 2005). There are various ways the brain can learn utilizing Brain-Based Learning activities such as, music, mind maps, role plays, journals, model building, movement, community projects, theater, and art (Jensen, 2005). Bonomo (2017) pointed out Brain-Based Learning Theory encompasses differences between how males and females learn, including deductive and inductive reasoning, abstract and concrete thinking, and the use of language, logic, evidence, and symbolism.

Jensen (2005) identified the three most important features of the brain involved in learning includes adaptability, integration, and sophistication. The brain's adaptability provides children with the opportunity to change and grow through interactions with new experiences and their environment (Jensen, 2005). Genetics contributes to who students are and who students become, however, how a student behaves and thinks can be changed (Jensen, 1995).

Jenson (2005) describes integration as the process of the brain in storing information to accomplish a task. Different areas of the brain can collaborate but can also compete for storage space (Jensen, 2005). For example, the temporal and frontal lobes compete and cooperate when different areas of the brain process particular types of information. Previous research determined the left hemisphere engages in processing logical information, whereas the right hemisphere processes creative information (Jensen, 1995). However, Davidson identified the right hemisphere is activated by negative emotions and the left hemisphere actually creates positive emotions (1992).

Jensen (2005) describes sophistication as the complexity of the brain. When information from an outside source comes into the brain, the information will be directed to the thalamus for processing (Jensen, 2005). However, the occipital and temporal lobes can also be used for processing (Jensen, 2005). Information then goes to the amygdale which distributes information to the hippocampus (Jensen, 2005). The hippocampus then organizes and connects to previous information (Jensen, 2005). The process can take just a second, or could potentially take up to weeks to accomplish at times (Jensen, 2005). Jensen (1995) further demonstrates the need for prior knowledge to be related to what is taught. When students have prior knowledge, students can grasp coherence (Jensen, 2005).

### **Rationale for the Study**

When comparing the United States performance in literacy skills, the performance was above average (Reardon, Valentino, & Shores, 2012). However, when focused on knowledge-based literacy and comprehension skills, two-thirds of students do not attain proficiency by the end of middle school (Reardon, Valentino, & Shores, 2012).

Furthermore, most U.S. students are not reading at a proficient level by fourth grade (Reardon, Valentino, & Shores, 2012). A reading assessment administered by Reardon, Valentino, & Shores in 2011 identified 67% of fourth graders scored above a basic level, which revealed students could use text to locate information, understand simple inferences, and use textual support to form opinions (2012). The study results also demonstrated, 34% of fourth graders scored at the proficient level, which showed students possessed higher-order reading abilities (Reardon, Valentino, & Shores, 2012). The students scoring at the proficient level on the assessment were able to understand a variety of texts, draw conclusions, and understood evaluations (Reardon, Valentino, & Shores, 2012). On the international reading assessment administered by Reardon, Valentino, and Shores, about 8% of students scored at the advanced level, which indicated the students were more intelligent, understood higher-order knowledge-based competencies, able to create inferences, and use text to justify evaluations (Reardon, Valentino, & Shores, 2012). It is important educators understand and acknowledge the differences between the ability of students to learn and a student's need to become successful with reading at the third-grade level (Reardon, Valentino, & Shores, 2012).

If students are unable to read, there is a more likely a chance the child can become incarcerated (Ventura, 2013). The United Way of the Mid-South (2016) looked at a claim of politicians and journalists which showed the planning of prison beds can be compared with the performance of third-grade reading scores. The importance of the relationship between the ability of children to read and how prone individuals are to violence is described by Ventura (2013). Ventura (2013) states there is an “undeniable connection between literacy skills and incarceration rates...a student not reading at his or her grade

level by the end of third-grade are four times less likely to graduate high school” (pg. 2). The United Way of the Mid-South (2016) shared statistics 85% of juveniles have a low literacy rate and also mentions high school dropouts are 3.5 times more likely than high school graduates to be arrested in their life. For the number of reasons, examples, and research stated above, it is important to understand the teaching practices third-grade educators are implementing with their students.

Schools need to address the use of Brain-Based Learning Theory in the classroom to further the learning of students before third-grade (Prez, 2008). Teachers know Brain-Based Learning will improve literacy and reading proficiency of students (Prez, 2008). Reading proficiency depends on expert teaching so the reader learns how to access print accurately and fluently (Prez, 2008). Having personal experiences is important and one of the strategies for Brain-Based Learning (Jensen, 2005). Children understand information better if it is integrated with personal experiences (Prez, 2008).

Another way to help improve student literacy is through Title I funding. The purpose of Title I funding is to provide schools/districts with financial assistance to improve student learning in literacy and math through the hiring of educators and purchase of educational materials (Missouri Department of Education, 2019). Title I funding going to schools is based upon the percentage of children from low-income homes (Missouri Department of Education, 2019). When considering the importance of Title I funding, it is important to note the income-achievement gap which demonstrates many students who come from higher-income families generally have better reading skills (Reardon, Valentino, & Shores, 2012). The income-achievement gap is shown by a standard deviation of 1.15 for third-grade students from either high- or low-income

families (Reardon, Valentino, & Shores, 2012). A standard deviation of 1.15 for the income-achievement gap is the largest when compared with race or gender (Reardon, Valentino, & Shores, 2012). Title I funding was supplemented to schools to reduce the opportunity gap (Missouri Department of Education, 2019).

The purpose of this causal-comparative study was to test the theory of Brain-Based Learning by Eric Jensen (2005) when comparing the perceptions of male and female third-grade educators regarding Brain-Based Learning, in both Title I and non-Title I funded public schools in the state of Missouri.

### **Research Questions**

The researcher studied the perceptions of third-grade male and female teachers in regard to Brain-Based Learning Theory. The researcher studied if the BBLSQ made a difference in either Title I funded or non-Title I funded schools for third-grade male and female teachers. More specifically, the Brain-Based Learning Survey Questionnaire (BBLSQ) was administered to participants to understand the perspective of third-grade educators and how gender and Title I funding was differentiated.

RQ1: What are the differences in the perceptions of third-grade male and female educators when applying the Brain-Based Learning Theory as reported by the Brain-Based Learning Survey Questionnaire (BBLSQ)?

RQ2: What are the differences in the perceptions of third-grade educators applying the Brain-Based Learning Theory as reported by the BBLSQ in schools which do and do not receive Title I funding?

## **Null Hypotheses**

H<sub>0</sub>1: There are no statistical differences in the perceptions of third-grade male and female educators when applying Brain-Based Learning Theory as reported by the Brain-Based Learning Survey Questionnaire (BBLSQ).

H<sub>0</sub>2: There are no statistical differences in the perceptions of third-grade educators on applying the Brain-Based Learning Theory as reported by the BBLSQ in schools which do and do not receive Title I funding.

## **Limitations, Delimitations and Assumptions**

This study provides an advanced, research-supported inquiry, but does include a number of limitations. Future studies might need to address the points noted below to further studies on Brain-Based perceptions. The most significant limitations, delimitations, and assumptions are listed below with the additional items. Limitations are as follows:

### **Limitations**

- The number of survey responses completed when compared to the number of surveys distributed.
- The number of schools implementing Brain-Based Learning.
- The number of male versus female educators teaching third-grade.
- The number of schools receiving and not receiving Title I funding.
- The knowledge of third-grade teachers regarding the Brain-Based Learning Theory.

### **Delimitations**

- The study did not attempt to analyze demographic data, such as race from the school districts surveyed.
- The study did not survey schools outside of Missouri.
- The study did not address additional grade levels, only grade three.
- The study did not address teachers' educational level or years of teaching experience.
- The study used only schools utilizing Brain-Based Learning Theory strategies in the classroom.

### **Assumptions**

- It is assumed the list of schools participating in the BBLSQ accurately implements Brain-Based Learning.
- It is assumed the participants taking the survey were truthful.
- It is assumed the participants who are taking the survey were a representative sample of the population.

### **Design Control**

This research is a quantitative casual-comparative study. The study implemented the BBLSQ (Klinek, 2009) survey to identify teacher perceptions of Brain-Based Learning knowledge, beliefs, and practices from third-grade public school educators in Missouri. The researcher examined both male and female Brain-Based Learning perspectives.

The survey was distributed to principals in Missouri whose faculty implemented Brain-Based Learning strategies as a regular part of the teaching and learning process.

The principals then distributed the survey to third-grade educators in their buildings to take voluntarily regarding the topic of Brain-Based Learning. Once the surveys were distributed, the researcher gave the participants two weeks to respond. After the first week the survey was sent out, a follow up email was sent to remind the principals of each district to prompt their third-grade educators to respond to the survey. There are 560 school districts in the state of Missouri and 92 districts were asked to participate in the study. The public school districts asked to participate included rural, urban, and suburban districts. The survey sought to identify the differences in the perceptions of educators implementing Brain-Based Learning by utilizing the Brain-Based Learning Survey Questionnaire (BBSQ) with third-grade male and female educators. The survey also sought to determine the differences in the perceptions of educators utilizing Brain-Based Learning in the classroom by using the Brain-Based Learning Survey Questionnaire (BBSQ) with educators teaching in schools with or without Title I funding. Title I funding encompasses both English Language Arts and Mathematics, however, the researcher will focus on English Language Arts only since ELA is the foundation of learning (Buehler & Guignard, 2019).

### **Definition of Key Terms**

**Brain-Based Learning Theory.** Refers to teaching methods, lesson designs, and school programs which are based on the latest scientific research about how the brain learns, including such factors as cognitive development—how students learn differently as they age, grow, and mature socially, emotionally, and cognitively (Jensen, 2005).

**Department of Secondary Education (DESE).** A service agency which works with educators, legislators, government agencies, community leaders, and citizens to

create a public education system. DESE is responsible for early childhood to adult services (Missouri Department of Education, 2019).

**Elementary School.** Kindergarten through fifth grade.

**Literacy.** The ability to read and write, demonstrated through visuals and symbols (Missouri Department of Education, 2019).

**Missouri Assessment Program (MAP).** An annual set of mandatory standardized tests taken by students in the state of Missouri (Missouri Department of Education, 2019).

**Missouri Learning Standards (MLS).** The knowledge and skills students need in each grade level and course for success in college, other post-secondary training, and careers (Missouri Department of Education, 2019).

**Title I (“Title One”).** Part A of the Elementary and Secondary Education Act of 1965, reauthorized by the Every Student Succeeds Act of 2015, gives financial assistance to local education agencies and schools with a high percentage of children from low-income homes (Department of Education, 2019).

**U.S. Department of Education.** Federal department responsible for providing federal aid to educational institutions and financial aid to students. The U.S. Department of Education also keeps all national education records and conducts some educational research (Department of Education, 2019).

## **Summary**

In *Teaching with the Brain in Mind*, Eric Jensen looks at three of the most important features of the brain: adaptability, integration, and sophistication (2005). Jensen’s work provides the theoretical framework throughout this study. The study was

conducted to identify the discrepancy between male and female educators using Brain-Based Learning. Currently, the researcher was unable to find specific studies which examine differences in perceptions between male and female educators employing Brain-Based Learning. Furthermore, the researcher was unable to find research regarding if Brain-Based Learning is or is not impacted by Title I funding.

This chapter contained an overview of the reasons the study needed to be conducted. There is little to no evidence of Brain-Based research in any of the two areas: difference in the perspectives between male and female regarding Brain-Based Learning and Title I funded and non-Title I funded schools. Additionally, little knowledge identifying how Brain-Based Learning is connected to male or female teachers is available. Furthermore, little information regarding how Brain-Based research relates to Title I funded and non-Title I funded school is available.

Chapter Two explains how the brain learns and clarifies Brain-Based research and strategies. Chapter Two also includes a literature review which focuses on how the brain learns, Brain-Based Learning, Brain-Based teaching and research, and Brain-Based teaching strategies. The review of literature also details methods of teaching developed by Lucy Calkins, Balanced Literacy, adult learning, literacy programs, and Title I funding. Chapter Two concludes with an examination of school demographics and literacy curriculum present in elementary schools in Missouri.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **Introduction**

Schools are always looking for new strategies to further the learning of students (Bell, 2017). This research investigated the perceptions of third-grade educators in Missouri public schools applying and implementing Brain-Based Learning. The study specifically focused on the content area of reading. The following literature review examines current literature surrounding the topics of Brain-Based Learning and how Brain-Based Learning impacts other elements. Some elements which were considered to be relevant to observe were educators' gender, Title I funded, and Title I nonfunded schools surrounding Brain-Based Learning. The purpose of this study was to explore the difference of the perceptions regarding Brain-Based Learning based on the gender of the participants and whether or not the participant's school was a recipient of Title I funding. The literature review consists of an overview of existing research relating to how the brain learns and Brain-Based Learning, Brain-Based research and teaching, Brain-Based strategies, physiological explanation of adult learning, methods of teaching, Title I funded, and non-Title I funded schools. Additionally, this chapter provides a description of Brain-Based Learning and how Brain-Based Learning relates to third-grade male and female teachers' perceptions of Brain-Based Theory, knowledge, beliefs and practices, and the differences between Title I funded and non-Title I funded schools.

#### **How the Brain Works and Learns**

The theory of Brain-Based Learning is a holistic approach to the brain (Jensen, 2005). The brain is viewed as an orderly process, as a whole, rather than a sum of its

parts (Bonomo, 2017). According to Jensen (2005), learning begins once the brain is formed, and as the brain evolves over time, the brain is able to rewire itself to learn more efficiently. As an individual has new experiences, solves complex puzzles, and learns new behaviors, the brain will stimulate the release of adrenaline, initiating memory in learning (Jensen, 2005). The brain then sorts memories into several levels. The levels, which will be explained later in detail, are adaptability (the brain is always changing), integration of physical activity and cognitive development (structures of the brain are challenging and cooperating together), social experiences and learning, and processing information (the intricacy of the brain) (Jensen, 2005). Waree (2017) agrees with Jensen (2005) and Bonomo (2017) by describing the brain as able to rewire itself to learn and some examples which can be learned are feelings, perceptions, experiences, skills and process of knowledge, and thinking acquisition.

Sousa (2014) described the process of how the brain learns to read in three phases. The first phase of learning how to read is the pictorial stage, in which a child's brain photographs words and visualizes the shapes of the letters of the alphabet (Sousa, 2014). The second phase is the phonological stage, in which the brain starts to decode letters into sounds (Sousa, 2014). The third stage is the orthographic stage, in which children recognize words immediately and precisely (Sousa, 2014). Geake (2006) also agrees with Sousa's (2014) work through neuroscience it is evident the brain learns how to read through phonological decoding. Geake (2006) further explained phonics are needed for all children and individuals have different ways of learning phonics. Everyone can learn to read, but practice must be part of the program in order to learn. Kinach (2010) and Bransford (2000) evidenced neuropsychology supports meaningful learning,

which is similar to learning how to read. There are many similarities to how the brain works and learns between the genders, however, there are unique differences between the female brain and male brain that need to be explored (Risley, 2009).

### ***Female Brains and Male Brains***

James's (2015) research has described some differences in brain anatomy, chemistry, and utilization between males and females. A study by James (2015) revealed female brains can have just as many or more cells than a male brain, but are more dense in certain areas of the brain. James (2015) further explains there are two types of cells: neurons and neuropils. Neurons are the brains cells (James, 2015). Bonomo (2017) and Giedd, Castellanos, Rajapakse, Vaituzis, and Rapoport (1997) reported neuropils provide connections between neurons while also supporting structure, nutrition, and healing to neurons. Another study completed by James (2015) explained women have more neuropils in their brain than men, which can mean women have more connections between their neurons. James (2015) also shared women have more cells in certain portions of the brain which are devoted to memory which could impact how both genders recall information differently.

Nonetheless, after examining a number of studies there is not necessarily a clear indication a larger brain means an individual is more intelligent. Sax (2006) shared the male brain on average is about 10 to 15 percent larger and heavier than the female brain. Bonomo (2017) states the amygdala tends to be larger in males than females, and the size of the hippocampus in females tends to be considerably bigger in females than in males. The amygdala helps to process memories, and the hippocampus helps to create memories by transforming information from an individual's short-term memory into their long-term

memory (Bonomo, 2017). Bonomo (2017) studies have found the amygdala is connected to particular academic strengths including: spelling, verbal intelligence, mathematical calculations, and reading. The male brain possesses on average more than six times the amount of gray matter, which is related to general intelligence, than the female brain (Bonomo, 2017). However, the female brain encompasses ten times the amount of white matter than the male brain, which is associated with intellect (Sax, 2006). Kaufmann and Elbel (2006) conducted a study which showed the inferior parietal lobe in the male brain is commonly larger than a female's inferior parietal lobe. The inferior parietal lobe is utilized for spatial and mathematical reasoning, an area which males tend to perform better in than females. The left hemisphere of the brain uses the ability to use language and connect to verbal and written language develops sooner in females (Kaufmann & Elbal, 2006). Females tend to execute better than males in using language and connecting verbal and written language areas (Kaufmann & Elbal, 2006). Jensen's (2005) work demonstrates the male mind develops at a different rate in relation to spatial memory and motor coordination than a female brain. Language and fine motor skills are perfected around six years earlier in females than in males (Hanlon, et., 1999). However, spatial memory tends to ripen four years earlier in males than in females (Hanlon, et., 1999).

Another way that could enhance the ability of males to learn is by manipulating materials. According to Bailey and Whitmire (2010), the use of manipulative materials to practice spatial skills is significant for male students. Manipulative materials during learning are helpful for males to learn since males tend to be kinesthetic learners and like to move around often (Bailey and Whitmire, 2010).

Brain research exhibits struggling readers have under-connected left-brain activity (Burns, 2015). Burns described having an issue with the occipital lobe can prevent someone from understanding individual letters and if Broca's area is not connected correctly the individual will have trouble with reading words out loud (2015). When looking into how the brain functions, educators need to know how to maneuver and accommodate for specific genders (Burns, 2015). Brain functions are different for each gender and teachers need to cater to the specific gender to help advance the learning of reading (Burns, 2015). Saleh and Subramaniam (2017) did a study on how Brain-Based teaching methods affect student achievement in physics. The research sought to explore any differences in the perceptions of male and female students with Brain-Based research and the study showed zero were present (Saleh & Subramaniam, 2017).

Bonomo (2010) found the area of the brain dedicated to spatial mechanical functioning in males was larger. Male brains utilize the cerebral cortex less than females (Bonomo, 2010). Males access the primitive areas of the brain more while performing the same types of tasks like routinely folding the bed or brewing morning coffee (Bonomo, 2010). When male brains need recharging, the brain must go into a rest state where the brain is accompanied by the body being in a sleep state which is not the case for recharging female brains (Bonomo, 2010). Males have less serotonin and less oxytocin, which can result in impulsivity and the inability to sit still when speaking with someone (Bonomo, 2010). Male brains are more compartmentalized due to less blood flow to the brain and tend to work better with symbols, abstractions, and pictures (Bonomo, 2010). Males have an easier time with math and physics than females and often prefer video games for the physical movement and destruction (Bonomo, 2010). Males tend to get into

more trouble for not listening, physical movement, falling asleep in class, and incomplete work on assignments when compared to females (Bonomo, 2010).

Females can multitask more than males because corpus callosum in the female brain tends to be 26% larger when compared to the male brain. The corpus callosum is where nervous tissue sends signals between the two halves of the brain (Bonomo, 2010). Females can move from one core subject to another easier because of their attention span (Bonomo, 2010). Bonomo (2010) explains neural connectors create listening skills and are more developed in female brains, and enhance listening skills, memory storage, and tone of voice discrimination for females. Females make less impulsive decisions because of more serotonin levels and have 15% more blood flow to the brain which allows for better integrated learning (Bonomo, 2010). Females also have more cortical areas for verbal functioning, giving females better sensory memory, sitting ability, listening, tonality, and the ability to understand more complex reading and writing skills (Bonomo, 2010).

James (2015) described the anatomy of the brain for males and females and concluded there were two hemispheres in the brain. The right hemisphere of the brain sends and receives information from the left side of the body and the left hemisphere of the brain sends and receives information from the right side of the body (James, 2015). James (2015) found both male and female brains work similarly except for a few major differences including the corpus callosum where nerve fibers connect to the two halves of the brain. James (2015) found momentous differences in the shape of the corpus callosum and the differences connected to behavioral characteristics in males and females. The planum temporal (PT) is found on both sides of the brain and located on the top of the

temporal lobes (James, 2015). The left lobe is the center for language and is larger than the right lobe (James, 2015). The difference in the size of the left lobe is more pronounced in men and tends to be more equalized for women as females tend to have a more balanced temporal lobe since females use both sides of the brain for language, whereas men usually use the left side of the brain which leads to the larger size (James, 2015). On the left side of the brain located in the temporal and frontal lobes are both Wernicke's area and Broca's areas (James, 2015). Wernicke's area is used for acquisition and comprehension of words, and Broca's area is used for grammar and the production of words (James, 2015). James (2015) found males normally use the left hemisphere of the brain for language and females use the right hemisphere of the brain, giving females more of an advantage in verbal fluency. James (2015) also explained both males and females use different parts of the brain to produce similar results in the end. James (2015) shared the amygdala is connected with emotions and the hippocampus is connected with making memories. James's (2015) study identified males have a larger amygdala and females have a larger hippocampus. The amygdala is associated with academic strengths in vocabulary, arithmetic, reading single words, and intellectual abilities and the left hippocampus exhibits spelling, reading and verbal intelligence (James, 2015). The right hippocampus includes strengths with math calculations and the right side of the amygdala is used for global and central processing (James, 2015). Males tend to use the right side of the amygdala whereas females tend to utilize the left side which implements more local and fine processing skills (James, 2015). An educator should gain a general understanding of how the brain functions and part of the understanding must include the knowledge of the differences between the male and female brain. The awareness of the

differences could be applied by an educator understanding the male brain tends to focus better on single tasks and the teacher could design lessons to best accommodate male students. Although there are differences which exist between the genders, the brain is still a complex organ which can adapt and integrate based on the environment and experiences presented.

### ***Brain Adaptation, Integration, and Complexity***

The brain is a constantly changing organ (Jensen, 2005). As children interact and react within their environment, connections within the brain are created to allow a child to adapt and learn from their experiences (Jensen, 2005). According to Jensen (2005), “heredity provides about 30-60% of our brain’s wiring and 40-70% is the environmental impact” (p. 30). Jensen (2005) also concluded while genetics play a role in how students behave, a student’s brain can change with the environment and actions from their environment. Jensen (2005) also discussed ways DNA is modified by life experiences: chromatin remodelers are proteins which enables other proteins to access the DNA to turn genes on or off. Methylation occurs when methyl groups act as molecular signage to turn on or off gene expression (Jensen & McConchie, 2020). Non-Coding RNA are some RNA sequences which interact with histone and methyl groups to influence DNA (Jensen & McConchie, 2020). Histone modifications to histone protein can make genes more or less accessible to change which can affect gene transcription (Jensen & McConchie, 2020). Transcription factors are proteins which bind quickly to affect DNA expression (Jensen & McConchie, 2020). The brain develops more connections through individual interactions within the environment. Bonomo (2017) found neurogenesis can be

differentiated and can play a role in how a child can utilize learning strategies to help gender-specific strategies.

Jensen (2005) explained the brain is made up of a variety of structures, which compete with each other but must also learn to cooperate with each other, through a process known as integration. Different areas within the brain work together to decide whether received information is pertinent enough to be stored (Jensen, 2005).

Competition happens in the brain when the brain is looking for space to store information in short-term or long-term memory (Jensen, 2005). Jensen (2005) stated people should abandon the idea the left part of the brain is logical and the right side of the brain is creative. Instead, Jensen (2005) described the right hemisphere typically processes information as a whole, in random order, and within a spatial context. The left hemisphere normally processes information in parts, in a sequence, and by using language and text representations (Jensen, 2005). Bonomo (2017) concluded the right hemisphere stimulates negative emotions and the left hemisphere mobilizes positive emotions. The brain is always competing, and will serve information from a first-come, first-serve basis (Bonomo 2017). The human brain is capable of performing a variety of low functioning tasks simultaneously (Bonomo 2017). Subsequently, learning is improved with the environment and a collection of stimulants which includes different strategies and physical and artistic student experiences (Bonomo, 2017).

Bonomo (2017) found the brain is complex and to understand more about the brain, people must understand how learning occurs. Input of new information to the brain comes from outside stimuli, thinking, or memory (Bonomo 2017). The information is then transmitted to the thalamus for processing while information is also sent to be

processed at the relevant cortical structures (frontal lobe, parietal lobe, etc.), and then to the subcortical areas (hippocampus, amygdala, etc.) (Bonomo 2017). Bonomo (2017) also shared in the case of an emergency stimulus, the amygdala will react and will engage with other areas of the brain for possible processing. The next step which occurs is the information is transmitted to the hippocampus for more evaluation as the hippocampus has the ability to organize, disseminate, and associate the information with other areas of the cortex for long-term storage (Bonomo 2017). The brain's ability to process information happens in milliseconds, however, the length of time for the brain to fully comprehend and store memories happens over hours, days, and possibly even weeks (Jensen, 2005). With the insight of how the brain adapts and integrates information to be processed, the next step is to gain an understanding of the key facets utilized during the learning process.

### ***Facets of the Brain's Learning Process***

Facets significant to the learning process include engagement, repetition, input quantity, coherence, timing, error correction, and emotional states (Jensen, 2005). Integrating the various facets into the learning environment can provide students with more enriching educational experience which also supports healthy brain development (Jensen, 2005). Enriched environments grow better brains (Jensen, 2005). For the brain to be able to comprehend each of the facets, it is important to know how the brain works and how children acquire learning. The brain needs to have high and complex stimulation, which helps increase how and what children learn (Jensen, 2005). Students need to focus and concentrate on reading tasks to improve intelligence in reading (Jensen, 2005).

**Engagement.** Jensen and McConchie (2020) interpreted engagement as a Brain-Based approach where classroom educators can greet students with a smile, which helps with social connections, increase involvement in school activities, and engagement in the classroom. Bonomo (2017) noted, engagement is the first factor for the learning process and Gazzaniga (2002) concluded 90% of learning is from the unconscious acquisition. Engagement is important to learning because having a student's attention allows students to focus and understand what is being taught in order to better increase learning (Jensen, 1995).

**Repetition.** Jensen (2005) found repetition of information increases and strengthens connections within the brain as practice helps the brain to build and create stronger neural pathways to reinforce new skills. Nathanson and Nathanson (2004) agreed practice is needed to learn, but practice needs to involve high quality literature. Jensen (2005) identified in the context of learning to read, having repeated exposure to reading strategies enhances a student's ability to learn. In addition, students presented with information in the form of patterns will help with retaining the information as patterns help to activate information and learning skills (Jensen, 2005). Patterns can also make the brain more accurate with future information (Jensen, 2005). Students can be presented with too much information at one time through a process known as overloading (Jensen, 2005). Overloading the brain with new information can result in errors or missed knowledge (Jensen, 2005). Jensen (2005), Marzano (2007), and Linden et al. (2003) suggested chunking information by providing new material in three to seven chunks. The learning of new materials varies in the length of time it takes for the material to be fully

understood as each learner learns at different rates (Marzano, 2007). Jacobsen (2020) found chunking information into small sections helps master a new skill.

**Input quality.** Bonomo (2017) described input quality as how much information can be processed from an outside environment and over a period of time. The brain needs time to store information into long-term memory and when students are given too much information at one time a negative impact on learning could result. Jensen (2005), Marzano (2007) and Linden et al. (2003) suggested to chunk information into three to seven chunks to prevent an overload of information. Kinach (2010) and Bransford (2000) determined information being learned and retained in long-term memory cannot be obtained unless the information is being repeated multiple times. Rehearsal and practice are needed in learning and retaining of information (Bransford, 2000). Bransford (2000) stated elaborate rehearsal is a process to store new information into long-term memory from short-term memory by leveraging prior knowledge to make connections to the new information. Bransford (2000) explains elaborate rehearsal is required with new and prior learning to help detect patterns and relationships, allowing the skill or information to then transfer to long-term memory.

**Coherence.** Jensen (2005) illustrated coherence as a learning factor simpler than the others because coherence relies on an individual's prior knowledge and perceptions of material to be relative as well as relevant. Jensen (2005) explored two concepts associated with coherence. The first concept is prior knowledge which occurs when a student has had a previous experience relating to a current learning experience (Jensen, 2005). Bransford (2000) explained prior knowledge relates to skills, beliefs, and influences from a person's environment. He further shared, pre-existing knowledge

begins with infants by initially learning sounds, languages, and movement (Bransford, 2000). When students are encouraged to make connections between prior knowledge and new material, students are able to better grasp the new material (Bransford, 2000).

Marzano (2004) explored numerous studies which have shown prior knowledge linked to achievement (Nagy, Anderson, & Herman, 1987; Bloom, 1976; Dochy, Segers, & Buehl, 1999; Tobias, 1994; Alexander, Kulikowich, & Schulze, 1994; Schiefele & Krapp, 1996; Tamir, 1996; Boulanger, 1981).

Not only does background knowledge affect an individual's ability to learn material, but background knowledge can lead to an individual achieving a higher status of occupation and income level as well (Sticht, Hoffstetter, & Hofstetter, 1999). Jensen (2005) explained the second concept besides coherence is mental models. Mental models allows an individual to understand a new concept because the person can apply a basic understanding of how something functions or is put together. Boaler, Dieckmann, Prez-Nunez, Sun, and Williams (2018) and Claro, Paunesku, and Dweck (2016) explained if students have a growth mindset then students can develop positive intellectual abilities and further their learning. Through an examination of the growth mindset and background of 1,500 participants, the study revealed is a growth mindset is present, despite a child's background, academic improvements can be made/accomplished (Claro, Paunesku, & Dweck 2016). The ability of an individual to apply prior knowledge with mental models encompasses the learning factor of coherence. Nathanson and Nathanson (2004) identified modeling language structures, accessing prior knowledge, and motivating children through emotional connection and emotional interests can help the brain transfer information into long-term storage.

**Timing.** Timing is another learning factor, according to Jensen (2005), and is described as the rhythms/patterns the brain and body adapt overtime. Jensen further describes timing by illustrating people have varying energy levels throughout the day (2005). The brain has different cycles typically 90 to 110 minutes in length with high and low periods of energy during each cycle as the cycles can be affected by outside environments (Jensen, 2005). Nathanson and Nathanson (2004) identified students need time to read in class so students have control over their own learning. Sousa (2014) and Jensen (2005) also recommend giving students choices to enrich their learning as students need high interest books, motivational reading, and learning to explore their own strengths.

**Error correction.** The next learning factor described by Jensen (2005) is error correction. Error correction is characterized by understanding the brain is typically unable to learn on the first attempt, and mistakes actually lead to learning (Jensen, 2005). Jensen (2005) and Bonomo (2017) explain trial and error does not necessarily mean a teacher should avoid direct instruction but depending on the subject taught trial and error can help students arrive at an understanding of the subject at hand. When experiencing trial and error students tend to have more neural networks (systems of neurons) due to trying different options before coming up with the correct answer or solution (Jensen, 2005).

**Emotional states.** Emotional states according to Jensen (2005) is another learning factor which can impact learning and remembering new information. The strength of emotion can influence what a scholar will retain during the learning process (Jensen, 2005). The strength of one's emotional state can be so strong when a high level of anxiety is present during a specific situation, an adolescent could relive the event if the

emotion is triggered (Jensen, 2005). Many factors such as smells or stress can produce positive or negative memories and trigger a child to remember certain events (Jensen, 2005). Both negative events and positive emotions can impact memory and the brain's circuits (Jensen, 2005). The neurotransmitter dopamine, which improves cognitive function is connected to positive emotions as positive emotions and even smells can cause the production of dopamine (Jensen, 2005). Jensen (2005) explained the link between the emotional brain and reasoning part of the brain can become impaired under stress and learning can be compromised. LeDoux (1994) found emotions have pathways and the pathways created include meaning and attention. Jensen (2005) also identified emotions assist in making meaning out of learning. Christianson (1992) found strong emotions are created when stimulated because these events generate strong memories and imprints.

How a mother takes care of herself can affect a child's brain development (Jensen, 2005). Eric Jensen (2005) discovered there are impacts with early development which can lead to learning issues in the future for both males and females. Jensen (2005) also found pregnancy stress can contribute to the failure of the development of structural lateralization and can affect a child's learning development and contribute to the development of stuttering and dyslexia. Jensen's (2005) studies have shown the more exposure a child has to language at an early age, the further language skills will develop in the future. Brain-Based research demonstrates the need to instill literacy learning in a child before and during third-grade (Jensen, 2005). Jensen (2005) further identified the left hemisphere of the brain responsible for language development. However, studies have shown the left hemisphere of a male's brain develops slower than females and the

slower development typically results in a higher chance of males developing language problems. Jensen describes some children are not ready to read at the age of four and some children may take up until the age of ten to read (2005).

An understanding of how the brain works and learns is important for an educator to know to better serve students. Various facets like engagement and repetition will help an educator understand how the brain learns to apply the knowledge to the implementation of effective teaching strategies. An educator understanding the repetition of information increases and strengthens the connections within the brain will be able to develop teaching strategies integrating best practices using repetition.

### **Brain-Based Teaching Strategies**

Al-Balushi and Al-Balushi (2018) found a need for neurons to make connections to further learning, for if there is a lack of connections or if connections are weakened then little to no learning occurred. Bransford (2000) explored the same concept of creating deep connections between stimuli and response and shared students' needs to have a community-centered approach within the classroom. A community-centered approach helps in constructing connections to the outside world and supports core learning morals (Bransford, 2000). Jensen (2005) explained, Brain-Based Learning refers to teaching methods, lesson designs, and school programs based on the latest scientific research regarding how the brain learns as well as cognitive development. Brain-Based Learning encompasses how students learn differently as they age, grow, and mature socially, emotionally, and cognitively. Zhang and Zhang (2017) interpreted further, Brain-Based education reflects psychology and is based on the natural laws of the brain. According to David Sousa (2014), a multitude of skills must be achieved when learning

to read. Educators must be cognizant of the following skills children should possess: motivation and attention, intensity, practice, cross training, adaptivity, and awareness of skill level (Sousa, 2014). An issue children face includes difficulty with paying attention to what is being taught due to many distractions in their environment (Sousa, 2014).

Thus, it is important for an educator to understand the background and interests of their students because a student's natural interest in a subject can help with the reading process. Perez (2008) agreed by stating, "Students need to be actively engaged in the processes of learning and becoming literate" (p. 2). Additionally, Zhang and Zhang (2017) acknowledged Brain-Based Learning as an active process, which includes reflection, meditation, and creative elaboration with the experience of learning, and can be developed through videos, computers, and role-playing. Research by the Florida Education Association (2015) revealed movement, coupled with the learning process, can help improve the development of children's education. Based on the research by Sousa (2014) and the Florida Education Association (2015), classrooms should adopt some type of movement to improve the student's ability to learn and students should participate in some type of movement totaling 40 to 60 minutes per day to lower stress and improve thought, focus, learning, and memory. Implementing movement during learning is critical (Sousa, 2014). When an individual is seated for twenty minutes, blood begins to pool in the feet, so even some type of movement can create more oxygen to the brain and increase learning (Sousa, 2014). Learning a new skill is difficult and requires intensity and concentration on the subject at hand. For the brain to get stronger there needs to be a demand for practice so the more someone reads, the better their reading skills become (Sousa, 2014). Cross-training is when there are multiple content areas being covered at

one time, such as language arts and history (Sousa, 2014). For example, cross-training could be utilized by teachers by leveraging what previously was taught in history with a new subject in language arts in an attempt to connect the pieces together. Jensen (2005) explained scientific research was utilized to determine multiple strategies which were applied to Brain-Based Learning. Bonomo (2017) identified 90% of learning happens during unconscious acquisition. Engagement is vital in learning and is demonstrated when students pay attention and focus the learning will increase (Bonomo, 2017).

Brain-Based Learning strategies are based on body, mind, and brain research (Jensen, 2005). If separated the body, mind, and brain “cannot break down the connections and affects students’ abilities to go beyond what they learned, apply knowledge, and analyze patterns” (McNamee, 2011, p. 41). Waree (2017) shared brains can learn better when mind maps are created and the creation occurs when the brain simplifies thinking and learning while improving efficiency. Bransford (2000) further explored mind maps as conceptual frameworks and said finding, learning, and transferring literacy is part of establishing conceptual frameworks. Conceptual frameworks allow students to learn information and apply the information to different situations. Al-Balushi and Al-Balushi (2018) further explained having connections with previous knowledge is essential to Brain-Based Learning and the teacher needs to adapt to what students know and adjust the lesson to fit the how students learn. In addition, the Florida Education Association also recognized having differentiated instruction to further student learning as an educator can never expect all students to be the same because each student is unique and learns differently (2015). Students should be allowed to celebrate diversity, unique abilities, talents, and interests (Florida Education Association, 2015).

Students having a personal connection with the topic, have an easier time learning how to read (Perez, 2008). The reason behind how students have real life connections is essential because real-life connections can lead to more meaningful learning and potentially retain what is learned in long-term memory (McNamee, 2011). Kahadija Al-Balushi and Sulaiman Al-Balushi (2018) found having connections among the subject matter helps students relate to what they are learning. Moore and Sellers (2015) exhibited Jensen's work regarding students looking for meaning through patterns and found once a person finds a pattern, a connection can be made which allows the brain to create meaning to the pattern. The goal of the brain is to find connections from prior knowledge and to grow further with experience (Jensen, 2005). The brain associates information and embeds the information into long-term storage (Jensen, 2005). Educators must monitor what students are learning to best regulate the reading process (Jensen, 2005). Observing students allows educators to see their pupils using different decoding skills while reading (Jensen, 2005). When students know how to decode unfamiliar words and understand more material, connections can be made and learning is improved (Jensen, 2005). With the improvement in learning, students tend to become more motivated and will keep practicing (Sousa, 2014). Dubrobsky found (2018) if coding and decoding skills are present, knowledge understood by the student and teacher was the result. This will create a learning experience and create meaning to what was taught (Dubrobsky, 2018).

Bonomo (2010) noted teachers should be encouraged to allow students to take breaks from sitting in the classroom during the day as breaks provide opportunities for students to move around the classroom. Hajar, Rizal, Kueh, Muhamad, and Kuan explained (2019) brain breaks not only increases a student's motivation to learn, but also

stimulates a student's health through helping students' mental health, academics, and lowering stress. Hajar, Rizal, Kueh, Muhamad, and Kuan (2019) share students who are given breaks tend to have better math skills, memory, and creativity. Additionally, teachers should organize sensory activities for students during the day to encourage learning rather than having students stay seated all day, which can lead to students experiencing tiredness and boredom. Hajar, Rizal, Kueh, Muhamad, and Kuan explained (2019) breaks and sensory activities are examples of how educators can provide opportunities for male students to compartmentalize their learning during the day. An example of a break which can assist with compartmentalizing student thoughts is to have a snack as healthy snacks provide many benefits such as glucose for the brain to boost a child's working memory, attention, and motor function (Florida Education Association, 2015). When taking a break, students can more efficiently break down their learning and understand what was taught.

Teachers began to evaluate research describing the neuroscience of the brain to gain a better understanding of how the brain learns to guide their teaching strategies for students (Winter, 2019). Winter (2019) disclosed Brain-Based Learning techniques are used to create meaningful learning and build real-life experiences. Brain-Based Learning uses more of a holistic approach to learning and examines the health of the learner (Jensen, 2005). According to Caine and Caine (1990), Brain-Based Learning strategies can be applied to all students no matter the learning challenges. Examples of several interactive teaching strategies include: (1) Orchestrated immersion: create a learning environment which surrounds the student with interesting, related, hands-on activities; (2) Relaxed alertness: eliminate fear while creating a challenging learning environment; (3)

Active processing: connect information to prior learning and allow the student to actively process the information (Sousa, 2014). Sousa (2014) also explained cross-training as a skill student's use background information from previous lessons to improve reading. Al-Balushi and Al-Balushi (2018) shared relaxed alertness, orchestrated immersion, and active processing are the best techniques in brain learning.

Sousa (2014) suggested to maximize learning, teachers need to educate in 20-40 minute segments. Three phases are used when teaching in 20-minute sessions, prime-time one, down-time, and prime-time two (Sousa, 2014). The first phase, prime-time one, is about 10-15 minutes, which is followed by down-time. The down-time phase lasts about two minutes and is followed by the third phase, prime-time two, which is about three minutes long (Sousa, 2014). When teaching, an educator can leverage these phases to help their students compartmentalize the curriculum (Sousa, 2014). An educator needs to comprehend how the brain prioritizes learning to in order to provide the most optimal learning time for their students (Sousa, 2014). David Sousa (2014) explained brain hierarchy of learning starts with: remembering the most information presented in the first phase (prime-time one); students best retain information during the last phase (prime-time two); finally students remember the least information in the middle (down-time). The teacher can accommodate to each students' brain by applying each of the three phases (Sousa, 2014). A hook and some type of exit slip helps students retain information taught (Sousa, 2014). Jensen (2005) also stated providing too much information, too quickly does not help students recall information. Instead helping students chunk down the information into smaller parts helps the brain process and reflect on what was learned (Jensen, 2005).

Benita Bell (2017) explained five learning strategies are key for students to learn to become successful readers in adulthood: (1) phonemic awareness, (2) phonics instruction, (3) vocabulary, (4) fluency, and (5) comprehension. Bell (2017) further shared repeating skills both build and strengthen neurons of the brain and improve phonemic awareness skills, phonics skills, vocabulary development, fluency, and comprehension. Reading the same word numerous times helps the brain store words visually in the form of a photo (Bell, 2017). 86-98% of a child's vocabulary comes from their parents (Bell, 2017). Parents with professional jobs have a higher vocabulary language of approximately 1,116 words, compared to students whose parents are of working class with about 749 words (Bell, 2017). To help with fluency, educators need to model the correct way to read a passage fluently and include pronunciation and expression (Bell, 2017). To help with comprehension, educators can model how to break down text as a comprehension strategy (Bell, 2017).

The creation of Brain-Based Learning strategies is based on body, mind, and brain research can improve a student's ability to learn (Jensen, 2005). Even though Brain-Based Learning can be applied, each student is unique and learns differently and educators should utilize different methods for teaching literacy to their students (Jensen, 2005). Methods for teaching literacy can use elements from Brain-Based Learning strategies including Lucy Calkins Unit of Study for Teaching Reading (Calkins, 2015).

### **Methods for Teaching Literacy**

Some elementary schools in the state of Missouri currently use Lucy Calkins Unit of Study for Teaching Reading. Calkins (2015) identified several components and essentials necessary for reading instruction. Readers need three key components: access

to books students believe to be interesting, time for reading, and expert instruction (Calkins, 2015). The ten essentials for reading instruction according to Lucy Calkins (2015) are:

- (1) Students need a teacher to demonstrate how to have passion for reading.
- (2) Readers need a long period of time to read.
- (3) Readers need to have opportunities to read high-interest books and to have access to choose their own interesting books.
- (4) Readers need to read more complex texts fit for their grade level.
- (5) Students need explicit instructions and strategies to become a proficient reader.
- (6) Students need opportunities to speak about and write a response about what they are learning.
- (7) Students need support in reading nonfiction books.
- (8) Students need feedback from assessments to help tailor specific learning of reading.
- (9) Reading aloud is essential. Reading aloud creates a sense of community in the classroom.
- (10) Students need a balanced approach towards reading and writing (p. 2).

Calkins shares the National Reading Panel recommends having Balanced Literacy instruction (Calkins, 2015). Jordan (2017) explained Balanced Literacy is a framework to help students to learn how to read, write, speak, and listen adequately. Students learn how to read and write through authentic experiences (Jordan, 2017). There are seven different types of models students learn from: shared reading, read aloud, guided reading, independent reading, writer's workshop, independent writing, and working with words (Jordan, 2017). According to Jordan (2017), portions of the Balanced Literacy framework coincides with Calkins (2015) work as both utilize prior knowledge, phonics, and

vocabulary development in the curriculum. Jensen's work (2005) also utilizes prior knowledge to develop learning and is part of the Brain-Based Learning Theory.

Lucy Calkins (2015) and Balanced Literacy (Jordan, 2017) have a similar framework as both seek to improve literacy skills and promote higher level of thinking and recommend having both whole class and small group discussions to further improve literacy skills. Jensen (2005) believed information taught must be relevant to help with input quality which is how much information can be processed over a period of time and can help with coherence using prior knowledge to make connections. Policastro (2018) explained the reading or literacy lesson for the students is interactive, which means the readers are engaged in discussions throughout reading the text. Through discussions, students can often implement prior knowledge to relate to the text and have a better learning experience through the Brain-Based Learning factor Jensen (1995) described as coherence. As a student learns more and expands their knowledge, students will then develop high-level thinking and discourse (Jensen, 2005). Both the Lucy Calkins (2015) and Balanced Literacy (Jordan, 2017) programs view reading and writing need a balanced approach.

The *Unit of Study for Teaching Reading* from Calkins for third-grade students is based on four units completed throughout the year (Calkins, 2015). The four units include: Building a Reading Life, Reading to Learn: Grasping Main Ideas and Text Structures, Character Studies, and Research Clubs: Elephants, Penguins, and Frogs, Oh My! Many similarities exist between Lucy Calkins (2015) and Brain-Based Learning (Jensen, 2005). When students read the process of integration is utilized (Jensen, 1995). The brain uses both hemispheres to process the information learned and the language

which is represented (Calkins, 2015). In *Units of Study for Teaching Reading Grades K-5 Series Overview*, Lucy Calkins explained state-of-the-art tools and methods, as well as responsive and data-based instruction (2015). In Unit One, *Building a Reading Life*, children read books they are interested in and learn to develop a love for reading books and learn to choose books which are just right for them (Calkins, 2015). Through the completion of Calkins' Unit One (2015), students will also have cross training through Jensen's (1995) *Brain-Based Learning* and will be able to choose intriguing books from different curriculums which will contribute to creating interest in other subject areas as well. In Unit Two, *Reading to Learn*, by Calkins (2015), students will learn foundational skills when reading books as nonfiction can integrate various subjects such as science, social studies, and mathematics, helping students learn a variety of concepts. Jensen (2005) stated *Brain-Based Learning* includes crossing-training and integrates cross curriculum learning such as science and social studies. In *Balanced Literacy*, Jordan (2017) shared an instructional reading strategy of placing small groups of students with similar reading needs together. Using the instructional reading strategy, teachers select and introduce books at the instructional level of each student and support the reading using various teaching points as students read through the text (Jordan, 2017). The process of guided reading helps students improve comprehension skills and strategies, create background knowledge, oral skills, and provide opportunities for instructional-level reading (Jordan, 2017). Jensen (2005) agreed background knowledge is an essential feature for the brain to learn how to read. When guided reading is utilized, students are given a variety of texts and are challenged to grow using new strategies to understand new texts independently (Jordan, 2017). During the process of guided reading, teachers

utilize observations and assessments and use the results to group students according to growth and progress (Jordan, 2017). Unit Two motivates children to learn more about other subjects. In *Units of Study for Teachings Reading, a Workshop Curriculum, Grades K-5*, Calkins explained Unit Three: Character Studies, study of characters from the current book a student is reading regarding a topic that is both interesting and motivating to the student assists in learning (Calkins, 2015). Jensen (2005) believed emotions have their own memory path and helps students both remember and create meaning of what is read. Reading is a journey and having a great book to deeply study brings intensity to learning (Calkins, 2015). Lastly, in Unit Four: Research Clubs Elephants, Penguins, and Frogs, Oh My!, students learn new skills of how to research and study animals (Calkins, 2015). Throughout the unit students are focused and concentrating and practicing new skills and cross-train with science (Calkins, 2015).

Many similarities are found in Lucy Calkins (2015) teaching of reading and Eric Jensen's (2005) methods of teaching reading. In reading further into Lucy Calkins' *Units of Study for Teaching Reading for Third-Grade*, it became more apparent Calkins follows a plethora of Brain-Based Learning strategies. In each unit, teachers make anchor charts focused on the teacher's mini-lessons (Calkins, 2015). Calkins (2015) used Jensen's (1995) and Sousa's (2014) methods of chunking to teach lessons and provide optimal learning. Policastro (2018) explained school teachers using cognitive resources to actively engage pupils in thinking about the text, such as Webb's Depth of Knowledge (DOK), is similar to Balanced Literacy. Calkins also recommends creating a visual for students to focus on what is being taught as visuals create an intense learning environment for the students. Anchor charts also provide active engagement (Calkins,

2015). Brain-Based research by Jensen (2005) also expressed engagement as a key factor in the learning process. Sometimes students will add to the anchor chart, a tool used to capture the most important subject matter, which is then used to practice what they learn from the chart independently (Calkins, 2015). Adding to the anchor chart will help students become engaged with their learning and be able to apply what the student has learned from the anchor chart to their individual work (Calkins, 2015). Calkins also integrates concepts from Kaufeldt's (2010) work, *Begin with the Brain*. Kaufeldt explained teachers should have visuals for the students to be able to refer to during the day to reduce the anxiety a child has and allow for more information to come into the brain (2010).

Despite the vast implementation of Lucy Calkins' materials, Hanford (2020) believes Calkins' materials do not align with the science of reading. Hanford (2020) stated many schools use Calkins' *Units of Study* series to teach reading as the series is one of the top three reading curriculums used in the United States. She explained the program was created for students with a strong background in reading, knowing how to read, and primed to read (2020). However, for students who need more practice in reading and language development, the material does not help students succeed and is a weak curriculum for English Language Learners (Hanford, 2020). Hanford (2020) performed an analysis of Calkins' *Units of Study*, in 2017 as the test scores in the United States were under examination. Hanford (2020) found more than a third of the nation's fourth-graders could not read at the basic level. Hanford (2020) discussed Calkins' *Units of Study* is difficult for students who come from less of a reading background and

oftentimes from a low SES background and often include Title I students who have more of a difficulty in learning literacy.

Before 2018, there was no instructional materials for phonics from Calkins which Calkins recognized as a gap and proceeded to develop a phonics program (Hanford, 2020). In creating the phonics program there were areas of concern noted by Hanford (2020). The phonics program encouraged children to use the three-cueing system (Hanford, 2020). Which is described as a process where readers use three types of cues in learning to read (Hanford, 2020). The three types of cues utilized by readers are graphic cues, syntactic cues, and semantic cues (Hanford, 2020). The programs encouraged children to look at pictures and use context clues to identify words during reading (Hanford, 2020). Slavin (2011) also explained phonics as the basis of learning literacy, in particular reading. The two programs he studied were *Success for All* and *Direct Instruction*, and both emphasize phonemic awareness, phonics, comprehension, and vocabulary (Slavin, 2011). *Direct Instruction* is structured and has a step-by-step synthetic phonics approach and implements decodable text (Slavin, 2011).

Despite the new phonics materials, Hanford (2020) has shown superb readers do not use cues to read words and instructing students to use cues emphasizes the habits of struggling readers. The first problem with the three cueing system is not enough time to teach and the program only allotted 20 minutes a day for phonics and did not provide students enough time to practice (Hanford, 2020). The second problem with the three cueing system was assessment as there is little to no guidance available to assist teaching in helping students struggling with reading (Hanford, 2020). The third problem with the three cueing system includes having a prior background with reading, as not all students

will have prior background knowledge and skills, especially students already struggling with basic reading skills (Hanford, 2020). Prior knowledge is one important aspect to Brain-Based Learning, according to Jensen (2005) prior knowledge is key in helping students learn. Calkins' (2015) openly shares the three cueing system is not built into the *Units of Study*, instead Calkins uses MSV which stands for meaning, syntax, and visual. Hanford (2020) stated students who come from a background with more exposure to academic language will succeed with Calkins' *Units of Study* (2015) curriculum, however, students who do not have exposure to academic knowledge and vocabulary will have a hard time in succeeding with Calkins' program.

Balanced Literacy (Jordan, 2017) and Calkins (2015) emphasize different ideas in some areas of literacy. Balanced Literacy (Jordan, 2017) focuses on independent and group work whereas Calkins (2015) focuses more on becoming an independent learner and becoming independent in learning literacy skills. Slavin (2011) concluded phonics is one of the more important keys to learning literacy.

There are a variety of methods to teach literacy in schools such as, Balanced Literacy (Jordan, 2017), Brain-Based Learning (Jensen, 2005), and Lucy Calkins (2015). Each of the methods have some similarities and differences which can impact a teacher's perception. The perceptions an individual holds influences their use of teaching methods. It is important to expand upon the perceptions by learning what drives the perceptions a teacher holds regarding Brain-Based Learning and how Brain-Based Learning can be applied in Title I schools. The purpose of Title I is to examine ways to further close the opportunity gap for students who come from a disadvantage background.

## **Challenges with Title I Funding**

Missouri has multiple support systems to help with the education of students (Missouri Department of Education, 2019). Two major systems used are Title I funding and the Missouri Assessment Placement (MAP). Of the two major systems used, Title I funding is specifically used to help support students who are struggling with literacy (Missouri Department of Education, 2019). Specific guidelines are associated with Title I funding a district/school must adhere to in regard to literacy (Missouri Department of Education, 2019). Title I funding is dispersed by the government in allotted amounts to provide funding so districts/schools can help students who are struggling (Missouri Department of Education, 2019). The Missouri Assessment Placement (MAP) is utilized to assess the progress of schools with English Language Arts (ELA) (Missouri Department of Education, 2019).

According to Rodas (2019), Title I was first enacted in 1965. Then in 2015, Title I was part of reauthorization of the ESEA Every Student Succeeds Acts. Title I is funding for school districts with high concentrations of educationally disadvantaged students. Grant and Arnold (2015) shared Title I was established to solve the opportunity gap for the disadvantaged and advantaged scholars. The Department of Education (2019) released Every Student Success Act (ESSA) was signed on December 10, 2015 by President Obama and the education law was created to further expand equal learning opportunities to all students. Mayer, Wiley, Wiley, Dees, and Raiford (2016) explained Title I in the No Child Left Behind Act helped to create more economically advantaged academic counterparts and sought to provide quality education for students with low socioeconomic backgrounds. Mayer, Wiley, Wiley, Dees, and Raiford (2016) expanded

to share Title I funding provides resources and supplemental services for students at-risk and as a result high schools have experienced lower high school dropout rates and higher graduation rates. The U.S. Department of Education (2018) allocates funds for Title I to give financial assistance to local education agencies (LEAs) and schools with a high percentage of children from low-income families. The goal of the assistance is to help students meet state academic standards (U.S. Department of Education, 2018). The U.S. Department of Education (2018) sets aside 0.7% of the Secretary of Interior budget for Title I funding. Grant and Arnold (2015) stated 40% or more of a school's enrollment must be comprised of school children with a low-income family. The Secretary of Interior reviews subgrants of schools which is operated by the Bureau of Indian Education and then allocates federal funds using four statutory formulas (U.S. Department of Education, 2018). According to the U.S. Department of Education (2018), 15,759,802,000 dollars in 2018 were allocated for Title I funds.

The LEAs target schools receiving the Title I funds so schools with the largest percentages of children from low socioeconomic status families receive appropriate fund distributions (U.S. Department of Education, 2018). The schools targeted to receive funds must have at least ten children from low-income families and at least five percent of the LEA's school-age population (U.S. Department of Education, 2018). If a Title I school utilizes the targeted assistance program, schools are provided with Title I services which helps schools assist children who are struggling, or at risk of failing, to meet State academic standards (U.S. Department of Education, 2018). If schools have low socioeconomic status families which make up a minimum of 40% of enrollment, the school is eligible to utilize Title I funds to implement school wide services to improve the

achievement of low achieving students (U.S. Department of Education, 2018). Children from disadvantaged homes, often have a difficult time with learning due to not having the background or prior knowledge needed to make connections to the material (Jensen, 1995).

The most recent data from U.S. Department of Education (2018) participants reveals growth occurred during the school year of 2015-2016 as approximately 55,906 public schools in the United States took advantage of Title I accommodations. Title I accolades provide opportunities for academic support and learning opportunities to help students in lower-achieving schools improve on implementing challenging concepts and meeting state standards in core academic subjects (U.S. Department of Education, 2018). In addition, Title I funds are used to benefit additional support in reading, mathematics, special pre-school, after-school programs, and summer programs to emphasize school curriculum (U.S. Department of Education, 2018). According to the Department of Education, during the 2015-2016 school year, more than 26 million children were part of school's which utilized Title I funding, with approximately 58% of the funding was used for Kindergarten through fifth grade, and two percent was used for pre-school (Snyder, Dinkes, Sonnenberg, & Cornman, 2019).

The Missouri Department of Elementary and Secondary Education (2014) stated Title I funds are only eligible for targeted assistance programs and if the school serves an eligible Title I school attended area. A targeted assistance school is required to identify shareholders in the Title I program utilizing educational related, objectives, and uniform criteria (Missouri Department of Elementary and Secondary Education, 2014).

Administrators and Title I teachers are responsible for ensuring regulations are met such

as making sure items consumed with Title I funds are related to all Title I criteria (Missouri Department of Elementary and Secondary Education, 2014). Targeted assistance funded schools are to only use Title I funds for supplementation and the funds are not to be utilized for supplant funding, when enough Title I funding is not available (Missouri Department of Elementary and Secondary Education, 2014). Target assistance funding schools is reviewed annually through an ongoing process for students participating in the Title I funded programs (Missouri Department of Elementary and Secondary Education, 2014). Targeted assistance schools with Title I funding require parent involvement such as, participation with utilizing surveys, family events, conferences, and meetings (Missouri Department of Elementary and Secondary Education, 2014). Parents have access to the descriptions and explanation of the curriculum taught to their children (Missouri Department of Elementary and Secondary Education, 2014). Teachers also share information to parents about their child through letters, newsletters, emails, report cards, and conferences (Snyder, Dinkes, Sonnenberg, & Cornman, 2019).

Grant and Arnold (2015) explained Title I programs were designed to advance low-income students and Title I funds are allocated to schools having 40% or more children from low-income families enrolled in the school. According to the Department of Secondary Education, schools are eligible to participate within a Title I schoolwide program if the socioeconomic status level is over the minimum of 40% and the school currently receives Title I funding (Missouri Department of Education, 2019). The schoolwide programs using Title I funds are required to improve the entire educational program of the school, which in turn, helps students as well (Missouri Department of

Elementary and Secondary Education, 2014). While using the schoolwide program, schools are not required to identify particular participants for Title I services and the use of Title I funds to pay schoolwide staff do not need to be distinguished (Missouri Department of Elementary and Secondary Education, 2014). Schoolwide programs can use Title I funds to supplement the amount of funds for non-federal sources for the school (Missouri Department of Elementary and Secondary Education, 2014). Rodas (2019) explained to help close the achievement gap, Title I funds can help supplement low income pupils. Children from impoverished backgrounds have more expenses due to the different challenges they bring to the classrooms and schools (Rodas, 2019). Title I funding supports high-poverty districts to help assist students with academic challenges (Rodas, 2019). Schools with students who have extra needs are given additional funding to provide students the help they need as the funds can serve any and all students in the school (Rodas, 2019). A schoolwide program must review the progress of the schoolwide continuously as the plan should be revised frequently to ensure student needs and state standards are met (Rods, 2019). Schoolwide programs must also stay in contact with parents of the Title I funded students and inform the parents how to support their child's learning at home (Rodas, 2019). Parent communication can come in many forms, such as emails, applications, newsletters, conferences, and meetings (Department of Education, 2019). Grant and Arnold (2015) expounded if a school receiving Title I funding does not make sufficient progress annually, then the school is placed into a program improvement plan, which includes restricted use of Title I funding and possible restructuring. Grant and Arnold (2015) also explained the Elementary and Secondary Education Act of 1965

with the inclusion of Title I was created to help close the opportunity gap and assist students from disadvantaged backgrounds.

A challenge to closing the opportunity gap for Title I schools includes retaining quality veteran educators (Rodas, 2019). Rodas's (2019) research was completed in New York City for the 2009-2010 school year and the results demonstrate Title I elementary schools obtain less funding at \$214.49 per pupil than non-Title I elementary schools. No Child Left Behind was created to improve the quality of educators employed in Title I schools (Borman & Kimball, 2005; U.S. Department of Education, 2004). Mayer, Wiley, Wiley, Dees, and Raiford (2016) described the intentions of Title I funding was to have high quality, prepared, and trained educators assigned to Title I schools but the quality of educators varies amongst schools and districts. The characteristics and experiences teachers possess can greatly affect student achievement (Mayer, Wiley, Wiley, Dees, & Raiford, 2016). Teachers in most Title I schools are not as highly qualified when compared to teachers in non-Title I schools (Mayer, Wiley, Wiley, Dees, & Raiford, 2016). The requirements stated in No Child Left Behind detail a highly qualified teacher should hold a bachelor's degree at minimum, but did not specify exact certifications so each state can determine certification requirements accordingly (Mayer, Wiley, Wiley, Dees, & Raiford, 2016). Student achievement can be directly impacted by an educator's educational experience (Boyd et al., 2008; Clotfelter, Ladd, & Vigdor, 2006; Jennings & DiPrete, 2010; Wayne & Youngs, 2003; Wong, 2004). A mindset can help students have a positive outlook on education and can help improve literacy skills (Bradford, 2004). Bransford (2000) also explained prior knowledge relates to skills, beliefs, and influences from a person's environment, and pre-existing knowledge actually begins in infants by

initially learning sounds, languages, and movement. When students are encouraged to make connections between prior knowledge and new material, they are able to better grasp new concepts (Bransford, 2000).

Rodas (2019) explained individual teacher salaries are not taken into account when Title I funding is distributed to participating schools. Many schools with high needs students have alternative teacher certifications, such as Fellows Programs and Teach for America (Rodas, 2019). Programs such as Fellows and Teach for America allow new educators with a bachelor's degree, usually not in education, be placed into high need schools (Rodas, 2019). The teachers from such programs are typically paid substantially less than educators paid by the school district (Rodas, 2019). As a result of a difference in salaries between district paid and various programs, an issue with the "comparability" provision in Title I is present because school districts are able to use the district average for teacher pay and exclude teacher salary differences from calculations (Rodas, 2019). The key issue is schools in the same district can disclose the same amount of teacher pay between the schools even though there could be differences in pay (Rodas, 2019). The problem is schools with newer teachers do not obtain a proportionate amount of Title I funding because the funding is not equalized before distribution and thus leads to funding allocation which is inequitable (Rods, 2019). Rodas (2019) continued to share schools with low-income students tend to have fewer veteran teachers which most often earn salaries at the top of the salary scale. She stated veteran educators tend to move to more prosperous institutes with more funding which translates to instructors who are lower-paid and less experienced typically teaching at low income schools (Rodas, 2019). In addition, Mayer, Wiley, Wiley, Dees, and Raiford (2016) explained not only do the

teacher's characteristics play a role in children learning at school, but a teacher's experience has an impact on student achievement as well. An exact number of years required for teacher experience to impact student success is not explicitly determined, however, Mayer, Wiley, Wiley, Dees and Raiford (2016) determined at least one year of teaching experience results in student success. Experienced teachers are important as detailed by Rodas's (2019) study but the quality of educators in Title I schools tend to be less effective than educators from non-Title I schools. Non-title I schools have less resources for professional development, teacher training, and mentoring (Rodas, 2019). In having high quality educators, school children have more long-term academic success (Rodas, 2019). Teachers with more experience can improve student learning and improved student learning can lead to changes in the brain, which is adaptability of the brain (Jensen, 1995). Rodas (2019) described highly impoverished schools have less access to effective educators, which contributes to the large opportunity gap. When students from low-income families have a lower student-to-educator ratio with more equitable staffing, the gap between academics and opportunity decreases (Rodas, 2019). Rodas (2019) analyzed the quality of teachers in both Title I and non-title I funded schools and revealed Title I elementary schools have a higher percentage of below average quality educators and Title I educators have a 3.6% lower Welch's *t*-test than the non-Title I elementary schools. Mayer, Wiley, Wiley, Dees, and Raiford (2016) found the teacher-to-student ratio has a positive impact on student achievement when smaller class sizes are prevalent. Mayer, Wiley, Wiley, Dees, and Raiford (2016) described the positive impact of having smaller class sizes, but did not identify any characteristics of the school environment nor details of how the educators taught within the classrooms to

promote learners' achievements. Additionally, Mayer, Wiley, Wiley, Dees, and Raiford (2016) identified when the technology-to-student ratio is increased, student achievement increases as well. If an educator is not supported by Title I funding, does not have an experienced education degree, has a large classroom size, and a larger technology-to-student ratio it would be more difficult to close the opportunity gap for students versus if appropriate resources and supports were available (Mayer, Wiley, Wiley, Dees, & Raiford, 2016). States need to have more consistency and requirements of quality educators as more studies should be conducted to be in place to further the quality of educators in Title I schools (Mayer, Wiley, Wiley, Dees, & Raiford, 2016).

Mayer, Wiley, Wiley, Dees, and Raiford (2016) researched formative assessments in Georgia and found having a low-socioeconomic background is not the only factor impacting student success, but other factors such as parental educational background, parental support, encouragement of the child's education, access to educational opportunities, and groundwork outside of the school setting can potentially impact student achievement as well. Additionally, another factor to consider is there is no baseline of low-socioeconomic (SES) schools without federal funding to compare with Title I schools, so instead Mayer, Wiley, Wiley, Dees, and Raiford (2016) used the achievement of students in Title I schools versus non-Title I schools. Mayer, Wiley, Wiley, Dees, and Raiford (2016) excluded low-socioeconomic status and other characteristics of students in the two settings thus making it difficult to compare schools from low SES schools receiving federal funding with the schools not receiving federal funding for students from low-income homes. Mayer, Wiley, Wiley, Dees, and Raiford (2016) did not show how having a quality teacher, being certified in the traditional

means, or being certified through alternative methods would improve formative assessments in Title I schools and non-Title I schools, however, they did reveal having an educator with a higher degree did improve the student scores. The research concluded no distinction in having a small class size had any impact to improved student success, but did produce evidence having small group instruction within the classroom or peer-to-peer tutoring time improved student learning experience (Mayer, Wiley, Wiley, Dees, & Raiford, 2016). Mayer, Wiley, Wiley, Dees, and Raiford (2016) also examined the technology-to-student ratio and identified no significant impact on the learning of either reading or math on the formative assessments. However, generally students are more successful in learning when the ratio of students to technology is 1:4 but having 1:1 ratio technology demonstrates the strongest improvement to student performance (Mayer, Wiley, Wiley, Dees, & Raiford, 2016).

### **Summary**

The purpose of this study was to explore the different perspectives presented from the Brain-Based Learning Survey Questionnaire (BBLSQ) total regarding teacher gender and Title I funded and non-funded schools. Brain-Based Learning has many facets which can scrutinize reading skills and a portion of Brain-Based Learning is understanding males and females have different ways for understanding reasoning and the use of language, logic, evidence, use of symbolism, deductive vs. inductive reasoning, and abstract and concrete reasoning (Bonomo, 2017). In *Teaching with the Brain in Mind*, Eric Jensen (2005) identified three important features of the brain: adaptability, integration, and sophistication. Jensen's (2005) work provided the theoretical framework for the study. The Brain-Based Learning Survey Questionnaire (BBLSQ) provided an

understanding of whether gender or Title I funding had a role in Brain-Based Learning. Chapter Two featured different sources regarding Brain-Based Learning and current Brain-Based research. Also described in Chapter Two was the differences between the perceptions between both males and females as well as distinctive literacy programs used in Missouri schools: Lucy Calkins (2015) and Balanced Literacy (Jordan, 2017). Finally, information regarding the differences in Title I funded and non-Title I funded schools.

In completing the literature review several gaps were revealed. There was an insufficient amount of information regarding how an educator's gender factors into how a student learns within a Brain-Based Learning environment. Additionally, limited resources provided data on Brain-Based research relating to Title I funded and non-Title I funded institutions.

Chapter three includes methodology of the research to conduct the research. Research questions, null hypotheses, participants and procedures are discussed. The overall research design, instrumentation, and data treatment are also identified. The researcher presents the findings of the study in Chapter Four as well as the analysis of data based on the results of the study collected and analyzed. Finally, Chapter Five provides a conclusion to the data collected and recommendations based on the findings of the analyzed data.

## **CHAPTER THREE**

### **METHODOLOGY**

#### **Introduction**

The purpose of this causal comparative study was to explore differences in teachers' perceptions about Brain-Based Learning Theory in Missouri. The researcher took a further look into the perceptions of third-grade male and female educators using the Brain-Based Learning Survey Questionnaire (BBLSQ) and made comparisons to Title I and non-Title I funded schools. Demographic information was collected through electronic surveys to determine Brain-Based Learning through beliefs, knowledge, and practices of third-grade teachers teaching in schools receiving and not receiving Title I funding. The survey provided a summary of research findings and Chapter Three discusses the purpose and rationale of the study, research procedures, and the participants. The data was analyzed using the IBM SPSS software and the methodology, research design, and treatment of data is described as well.

#### **Research Questions**

The researcher studied the perceptions of third-grade male and female teachers regarding Brain-Based Learning Theory (Jensen, 2005). The researcher studied whether the BBLSQ made a difference in Title I funded versus non-Title I funded schools for third-grade male and female educators. More specifically, a survey was conducted to understand the perspective of third-grade educators and how gender, and Title I funding was differentiated. The assumption was classroom teacher's use Brain-Based research techniques with third-grade students.

RQ1: What are the differences in the perceptions of third-grade male and female educators when applying the Brain-Based Learning Theory as reported by the Brain-Based Learning Survey Questionnaire (BBLSQ)?

RQ2: What are the differences in the perceptions of third-grade educators when applying the Brain-Based Learning Theory as reported by the BBLSQ in schools which do and do not receive Title I funding?

### **Null Hypotheses**

H<sub>0</sub>1: There are no statistical differences in the perceptions of third-grade male and female educators when applying the Brain-Based Learning Theory as reported by the Brain-Based Learning Survey Questionnaire (BBLSQ).

H<sub>0</sub>2: There are no statistical differences in the perceptions of third-grade educators when applying the Brain-Based Learning Theory as reported by the BBLSQ in schools which do and do not receive Title I funding.

### **Setting**

Geographic regions in Missouri include rural, urban, and suburban districts. School districts from each of the nine Regional Professional Development Centers (RPDC) were represented from Missouri (DESE, 2019). From the population of school districts in Missouri, 92 school districts were selected from the nine RPDC to provide a representation of the variety of third-grade educators in Missouri. The survey was designed to contribute to the wellbeing of society about learning of Brain-Based Learning perspectives of third-grade teachers and how Brain-Based Learning affects Title I and non-Title I funded schools. The school districts researched in the study were limited to 92 school districts which were K-8, public schools with third-grade classrooms. Districts

represented in the study varied in population, education level of the community population, income, and poverty level. The third-grade educators whom participated in the research were involved with Brain-Based Learning (Jensen, 2005).

Principals were provided with the objective of the survey, a request for permission for third-grade teachers to engage in the study, and were asked to identify third-grade teachers in the districts who participated in Brain-Based Learning. The third-grade teachers implementing Brain-Based Learning were sent an e-mail from their principal explaining how the survey would ask participants about their perception of Brain-Based Learning as well as knowledge, beliefs, and practices. Third-grade teachers were provided with both the objective of the survey and a request for permission to engage in the study. Demographic and qualifying questions for all third-grade teachers were asked at the beginning of each survey and included gender, years of experience, degree earned, and if their school was a Title I or non-Title I funded school.

### **Subjects and Sampling**

The researcher collected a purposive sampling of participants through a survey which was sent to 92 school districts with third-grade educators, through confirmation, utilized Brain-Based Learning and taught within the state of Missouri. Using the independent samples *t*-test with a power of .8, and alpha of .05 with a medium effect size (Cohen's *d* of .05), the study needed 51 participants in each group (total of 102) using G\*Power calculator (Faul, Erdfelder, Lang, & Buchner, 2007). The researcher attempted to collect data from nine RPDC regions with 92 school districts within Missouri and included rural, urban, and suburban districts. The participants in the study were third-grade educators from public schools in the state of Missouri, teaching in either a Title I or

non-Title I funded schools. Participants of the sampling were identified through public-school principals in the state of Missouri. U.S. Bureau of Labor Statistics (BLS) requires third-grade teachers hold at least a Bachelor of Arts (BA) degree or Bachelor of Science (BS) degree in elementary education programs, have teaching certification credentials, and must know how to instruct a variety of subjects including math, social studies, reading, and science (2016). Furthermore, the U.S. Bureau of Labor Statistics (BLS) also recommends third-grade teachers have communication skills to effectively communicate with students, parents, administrators, and other educators (2016). Third-grade teachers must be creative, adaptable, patient, compassionate, and have the ability to handle stressful situations (Bureau of Labor Statistics, 2016). Each principal of the 92 school districts were invited to ask their third-grade teams to participate in the study if the teachers utilized Brain-Based Learning. Districts were identified through purposive sampling with schools which included third-grade teachers. Each principal was sent an email to identify if the school utilized Brain-Based Learning. If the school implemented Brain-Based Learning, the principal was instructed to send a link to their third-grade educators which included the BBLSQ survey for the teachers to complete. Each participant was sent an Informed Consent to Participate (Appendix D), to participate in the BBLSQ survey. No compensation was given to the principals, and the participation of the third-grade teachers was completely voluntary. Participants were contacted through a distributed email with a link to the BBLSQ Google Forms survey which was provided to the third-grade teachers to participate in the BBLSQ survey from their building principals.

The study included districts with varying populations, educational levels of the community population, income, and poverty level. Participants of this research were asked demographic questions and additional survey questions which were based upon a five-point Likert scale. The Likert scale prompted the third-grade educators to reveal their agreement or disagreement with statements provided in the survey regarding their perception of Brain-Based Learning. The survey had four designed sections: demographic information, knowledge, beliefs, and practices of Brain-Based Learning. A Google Forms survey was utilized by the researcher to collect data from each participant anonymously. Participants were asked to complete and return the BBLSQ survey within two weeks of the distribution.

### **Research Design**

A quantitative causal-comparative perceptual study to compare the results of survey knowledge, beliefs, and practices of Brain-Based Learning between third-grade male and female educators and Title I and non-Title I funded schools was conducted. The casual-comparative method of research established association between variables, which indicates a true cause-and-effect relation occurred between variables of third-grade male and female educators and Title I and non-Title I schools. The method utilized for the study was appropriate since a comparison of two independent variables: third-grade teacher's gender and Title I and non-Title I schools in the context of Brain-Based Learning was present. The researcher compared averages of two samples which were selected independently of each other (Siegle, 2002). A research design of experimental design best fit this quantitative casual-comparative study as there was a manipulation of variables regarding Brain-Based Learning and the conditions of the participants were

third-grade male and female educators and teaching in either a Title I or non-Title I school. An email with a link to the BBSQ survey was sent to principals who indicated teachers implemented Brain-Based Learning within their schools. A reliable and valid survey by Dr. Shelly R. Klinek (2009) was used to determine the perceptions of Brain-Based Learning for third-grade male and female teachers and Title I and non-Title I schools. Principals were asked to forward the survey to third-grade educators within the school. The survey was distributed through e-mail with an explanation regarding the purpose of the survey and a deadline for completing the survey. Third-grade teachers utilizing Brain-Based Learning were surveyed only once with a goal to compare differences between the variables of the study. The researcher included a purposive sample to establish a valid estimate of differences between variables which were collected. Having a purposeful sample of data helped the researcher interpret data of a specific group of educators and enhanced the importance of the impact on Missouri's population of third-grade teachers.

Once the survey ended, data was separated into two categories. Category one reviewed the perceptions of Brain-Based Learning as it pertained to the gender of the educators. Category two looked at the perceptions of Brain-Based Learning as it pertained to Title I and non-Title I funded schools. After the data was collected, an independent samples *t*-test was utilized to compare the results of each category through Statistical Package for Social Sciences (SPSS) to demonstrate the differences between the variables.

## **Research Procedures**

In order to comply with Southwest Baptist University protection of human participants, a request for review was submitted to the Research Review Board. The request asked permission to survey third-grade educators in the state of Missouri. The potential risks posed to the third-grade teachers in Missouri participating in the survey are minimal to none. A requisition for review will be submitted to the Research Review Board for approval to survey approximately 1,000 participants for this study. The Research Review Board (RRB) approval is located in Appendix B. Once the researcher received approval from the Research Review Board, the process of participant recruitment and data collection started. The survey was executed in accordance with the guidelines of Southwest Baptist University regarding the protection of human participants.

The researcher also obtained permission from the author of the Brain-Based Learning Survey Questionnaire to use with participants during the study. To obtain consent, Dr. Klinek was contacted by email (Appendix E) and phone to request the use and modification of the Brain-Based Learning Survey Questionnaire (BBLSQ) as the survey instrument used in the researcher's dissertation. Dr. Klinek contacted the researcher two weeks later on March 20, 2019 by phone. During the conversation, Dr. Klinek gave permission to use and make modifications to align the survey with the researcher's dissertation. The researcher also reached out to obtain written consent to be able to modify and utilize Dr. Klinek's survey on August 31, 2020 and she responded on September 1, 2020 with written consent (Appendix E).

At the beginning of the survey, third-grade teachers were given information regarding the purpose of the research, voluntary participation, and the confidentiality of the information collected throughout the survey. The survey was voluntary and confidential. Participants of the sampling were identified through public-school principals in the state of Missouri. Principals were sent an email which asked principals to identify if their school utilized Brain-Based Learning. If the principal's school did not utilize Brain-Based Learning, the principal did not forward the survey to the third-grade educators. The principal's email consent is located in Appendix C. If the principal indicated the use of Brain-Based Learning, the principals were provided with a link to the Brain-Based Learning Survey Questionnaire (BBSQ) and were asked to forward the survey to third-grade teachers using Brain-Based Learning. The informed-consent documents for third-grade educators to conduct research are located in Appendix D and the BBSQ is located in Appendix A.

Data was collected using Google Forms to distribute surveys to Missouri public school districts during the 2020 school year and the data collection lasted two weeks. The targeted population for the study was 92 public school districts with third-grade educators teaching in the state of Missouri. Utilizing the Missouri Department of Elementary Secondary Education database, a list of all public schools in the state of Missouri was obtained. Once a list of all of the public schools in the state was generated, 92 public school districts with third-grade teachers were selected with purposive sampling from each RPDC region. The school principals from each district were provided with an introduction to the purpose of the study, voluntary participation, and confidentiality of the information collected through the survey. If the school was identified as using Brain-

Based Learning, a link with the survey titled, Brain-Based Learning Survey Questionnaire (BBSLQ), which was developed by Klinek (2009), was sent to the school principals. The principal was then instructed to send a link with the Informed Consent to Participate (Appendix D) and the BBSLQ survey link to the third-grade educators. A deadline of two weeks was given to complete the survey. As the deadline neared, a second request was emailed to the principals after one week to remind their third-grade educators who had not yet completed the survey to increase participation. The period for collecting all survey responses closed after the two week allocation. After the deadline passed, the data was collected from the surveys.

### **Instrumentation**

The instrument utilized to measure the impact in this research was the Brain-Based Learning Survey Questionnaire (BBSLQ). The survey for educators is located in Appendix A. The survey was created to measure the perceptions of the knowledge, beliefs, and practices of Brain-Based Learning in the classroom. The survey was previously utilized in prior studies by Dr. Shelly Klinek, the creator of the survey. The researcher contacted Dr. Klinek through email and phone correspondence to receive permission to revise and use the survey. Dr. Klinek established validity and reliability standards for the tool. According to Dr. Shelly Klinek, the Brain-Based Learning Questionnaire Survey was modified and validated by a panel of seven professors comprised college faculty members with ten or more years of experience, three physical therapists, one occupational therapist, one librarian, one college of education faculty member, and one school administrator with five years of administrative experiences. Dr.

Klinek decided to use the experts due to the combined experience of the panel with Brain-Based Learning (Klinek, 2009). The survey is located in Appendix A.

Dr. Klinek asked the panel of experts to validate and evaluate the competency statements, make any changes or edits as needed. The panel of experts updated the survey by making some edits, a few changes to the format of the survey, and corrected grammar. Dr. Klinek's original survey was originally comprised of 50 total questions, five demographic and 45 Brain-Based Learning questions, but this study omitted certain questions including Brain Gym due to the fact Brain Gym was not the focus of the research. There were two demographic questions inquiring about the participants age and whether the individual worked in a college or school of education which were omitted and replaced. The replacement demographic questions inquired about the Title I status of the participant's school and the preferred curriculum/program utilized in the elementary school. Furthermore, nine questions regarding Brain Gym were omitted from the survey as this was not the focus of the research. With the omissions and the additional questions, the modified survey for the study consisted of 41 total questions, five demographic and 36 Brain-Based Learning questions.

An online survey using Google Forms was used to collect data for this study. Prior to obtaining the Brain-Based Learning Survey Questionnaire (BBLSQ) survey, a letter was sent electronically to principals to ask if the school district utilized Brain-Based Learning and if third-grade elementary educators would be willing to participate. Once a principal responded to the initial email, the principal was then asked to forward a link with the Informed Consent to Participate (Appendix D) to the third-grade teachers, which also included the BBLSQ survey. Within the email an introduction letter was provided

with directions for completing the survey, the definition of Brain-Based Learning, consent to participate in the study, the purpose of the survey, and the researcher's information given. The survey was given to third-grade teachers who implemented Brain-Based Learning environments with their third-grade students.

The survey included the demographics of the participants and included: gender, years of teaching, highest degree, and if their school was Title I funded. The survey was grouped into three categories including: the knowledge of, beliefs towards, and Brain-Based Research practices. The survey consisted of a 5-point Likert scale, including: (1) Strongly Disagree, (2) Disagree, (3) Neither Agree or Disagree, (4) Agree, (5) Strongly Agree. The survey was distributed electronically by email and each participant was given a detailed description of the study. Third-grade educators were invited to participate in the study from all nine RPDC regions giving a diverse overlook of Missouri. The survey was divided into three groupings: (1) knowledge- 17 questions, (2) beliefs- 10 questions, and (3) practices- 9 questions. The knowledge of Brain-Based Learning were survey questions: 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 35, 36, 37, 38, 39, 40, and 41. Beliefs of Brain-Based Learning were survey questions: 16, 17, 18, 19, 20, 21, 22, 23, 24, and 25. Practices of Brain-Based Learning were survey questions: 26, 27, 28, 29, 30, 31, 32, 33, 34.

**Table 1**

*Internal Consistency (Standardized Alpha) for Scales*

	<i>N</i>	Number of Items	Reliability
Knowledge	188	14	.79
Belief	188	13	.86
Practices	190	9	.64

Klinek (2009) provided the Cronbach's alpha for the three constructs of the BBLSQ. Cronbach's alpha reliabilities were computed to test for internal consistency of the items for each scale. Reliabilities should be above .70 to be considered acceptable (Cronbach, 1951).

Even though the BBLSQ consisted of three constructs: knowledge, belief, and practices, Klinek (2009) did not provide construct validity information. Klinek (2009) used content validity to authorize the judgement from an expert panel (Gay & Airasian, 2000). Dr. Klinek had seven experts consisting of three in the field of therapy, one occupational therapist, one college of education faculty member with more than 10 years of higher education instructing preservice teachers, one librarian, and one school administrator with five years of administrative experience on her panel. The seven experts on Dr. Klinek's panel thoroughly reviewed the survey and items to determine if Brain-Based Research was well represented in the research (Gay & Airasian, 2000). Dr. Klinek's panel of experts provided feedback on all items as well as comments about the validity of the questions. Dr. Klinek made revisions to include more information regarding Brain-Based Learning and changed some wording to better represent Brain-Based Learning as well.

### **Treatment of Data**

This quantitative casual comparative study compared the differences between the means of the perceived impact of Brain-Based Learning with male and female third-grade educators and educators teaching in Title I funded and non-Title I funded schools utilizing the survey Brain-Based Learning Survey Questionnaire (BBLSQ) (Klinek, 2009). The researcher utilized the BBLSQ to analyze the data collected from each

participant with the Statistical Package for the Social Sciences (SPSS) computer software program. The Brain-Based Learning Survey Questionnaire (BBSLQ) provided qualifying questions regarding gender, years of experience, degree earned, and Title I or non-Title I funded schools for each participant. The survey questions allowed the researcher to run samples *t*-tests to compare demographic data. The demographic information from the survey was used to provide frequencies, percentages, means, and standard deviation to describe characteristics of the population. Collection of data was obtained by third-grade educators through the completion of the BBSLQ survey. Excel was utilized to filter data for participant gender and Title I and non-Title I schools.

Independent samples *t*-tests were completed to determine two independent variables, with the two categorical variables having two groups and one continuous dependent variable. The independent samples *t*-test was preferred as the statistical treatment, as it determines how the two means differed from one another and how significant the differences were (Gay et al., 2009). The categorical variable having two groups with one dependent variable needed to be established to run the independent samples *t*-test. The independent samples *t*-test variables were utilized to determine if a statistical difference between male and female educators concerning Brain-Based Learning was present. The independent samples *t*-test variables were also utilized to determine if a statistical difference from Title I and non-Title I funded schools concerning Brain-Based Learning was present as well. The dependent variable was measured by the BBSLQ survey.

For Research Question 1, the independent variable was the gender of the third-grade teacher participants. This study sought to determine whether a teacher's gender

made a difference in scores for Brain-Based Learning. Educators were asked to identify whether they were male or female. For Research Question 2, the independent variable was whether the school was either a Title I or non-Title I funded school. Teachers were asked to identify if they taught at either a Title I or non-Title I funded school. The independent samples *t*-test was used to determine if the null hypothesis would fail to be rejected. The independent samples *t*-test was chosen to determine the significance of the difference between the means of the two groups for each research question. The desired sample size for this study was  $n=102$  with an alpha level of .05, medium effect size, and a power of .8 (Faul, et. al., 2009). Sample size calculations for the independent *t*-test sample in both research questions indicated a 52 required return of 51 surveys per group (gender and Title I and non-Title I schools) for Research Question 1 and 2 with  $n = 102$  based on alpha = .05, power of .8, and medium effect size (Faul, et. Al., 2009). Data was exported to Excel and cleaned for missing cases and significant outliers. Post hoc analysis were conducted for each test to determine the report effect size with the null hypothesis at the  $p < 0.05$  level.

Research Question 1 attempted to identify the difference in the BBLSQ sum between third-grade male and female educators and research question two attempted to identify the difference in the BBLSQ sum between third-grade educators in schools receiving Title I and not receiving Title I funding. The research questions attempted to identify differences between the two groups, and in addition to descriptive statistics, independent samples *t*-tests were used to compare mean survey responses from third-grade educators to determine differences in the mean scores of the variables (Creswell, 2014).

The assumptions for testing were the dependent variables measured by the BBLSQ survey using a Likert scale. The assumptions for testing purposes included the following:

1. The dependent variable was measured by a Likert scale and the Brain-Based Learning Survey Questionnaire (BBLSQ).
2. The independent *t*-test included two groups: third-grade male and female teachers and Title I or non-Title I funded schools.
3. Participants could not participate in more than one group for each independent samples *t*-test created.
4. The significant outliers in each group were reviewed. Using SPSS the outliers were determined and boxplots were utilized to detect the outliers.
5. A test for normality by Shapiro-Wilk was utilized.
6. Utilizing SPSS, the researcher interpreted the results of each *t*-test to ensure homogeneity. SPSS used Levene's test for homogeneity of variances (Lund Research Ltd., 2018).

The researcher investigated the differences between the responses of male and female third-grade educators using the BBLSQ survey to determine if a significance at the .05 level was present. The standard for rejecting the null hypothesis, the alpha level, sets the accepted probability level (p-value) for the alpha level is at .05. The researcher may reject the null hypothesis and conclude there is a statistically significant difference (Gay, Mills, & Airasian, 2009; Pelham, 2013). An effect size is calculated to determine both effect size of identified differences between the means of the independent samples *t*-test. The value of the mean difference is divided by the standard deviation to determine

effect size by using a Cohen's *d* of 1.0 which indicates the statistical means of two groups vary by one standard deviation. A Cohen's *d* value of 0.2 is considered a small effect size with values of 0.5 and 0.8 generally considered medium and large effects (Creswell, 2014).

## **Summary**

The purpose of Chapter Three was to identify the methodology for the process of comparing the differences of third-grade educator's perceptions of Brain-Based Learning. In addition to examining the perceptions of third-grade teachers in regard to Brain-Based Learning, the researcher also examined if Title I funded or non-Title I funded schools made an impact on the perceptions of Brain-Based Learning. Data was collected from third-grade educators from public elementary schools in the state of Missouri. Third-grade male and female teachers' perceptions regarding Brain-Based Learning Theory was determined using the Brain-Based Learning Survey Questionnaire (BBLSQ). This quantitative study sought to determine if BBLSQ scores were differentiated between male and female educators teaching in either Title I or non-Title I funded schools. Furthermore, the chapter described the research procedures, research design, instrumentation used to collect data, and described how the data was treated. Chapter Four examines the results of the data analysis described in Chapter Three. Lastly, Chapter Five provides a summary of the entire study as well as recommendations and implications for further studies is to be addressed.

## **CHAPTER FOUR**

### **ANALYSIS OF DATA**

#### **Introduction**

The purpose of this causal-comparative study was to compare male and female educator's perceptions of Jenson's (2005) work on Brain-Based Learning with a focus on gender and the presence and absence of Title I funding in the state of Missouri. In Chapter Four, the data collected by the researcher as described in the previous chapter was analyzed and then used to address each of the research questions included the research findings. Specifically, the research questions which were addressed by the findings include: 'What are the differences in the perceptions of third-grade male and female educators when applying the Brain-Based Learning Theory as reported by the Brain-Based Learning Survey Questionnaire (BBSLQ)?' and 'What are the differences in the perceptions of third-grade educators when applying the Brain-Based Learning Theory as reported by the BBSLQ in schools which do and do not receive Title I funding?' The differences in the results of the survey between gender and the schools which do and do not receive Title I funding are presented based upon the feedback characteristics from the Brain-Based Learning Survey Questionnaire.

In Chapter Three, the researcher presented the procedures for conducting the study which included the participants and the selection process. Additionally, a complete description of the research setting involving Missouri public elementary schools utilizing Brain-Based Learning with third-grade educators and the schools which were Title I and non-Title I funded were described. A framework of the research design and treatment of data was presented. A request for participants was initially sent out to the principals of 92

different school districts which included public elementary schools in the state of Missouri. When a response indicating the use of Brain-Based Learning was received, a link to the Google Forms survey was provided to participants in the study. The researcher requested the principal provide the link to the Brain-Based Learning Survey Questionnaire (BBSQ) to third-grade educators using Brain-Based Learning. After the completion of the survey, the results from the study were uploaded into the IBM Statistical Package for Social Sciences (SPSS) software program for analysis.

The purpose of this chapter is to analyze the data through the use of data tables through compiling the results and then interpreting the results through the IBM Statistical Package for Social Sciences (SPSS) program. To determine if a statistically significant difference existed between the groups, inferential and descriptive statistics were utilized. The purpose of this casual comparative perceptual study was to compare the difference from a purposeful sampling of third-grade educator perceptions of Brain-Based Learning strategies. The research sought to distinguish if a difference in the perceptions occurred between educators based on gender and schools which were Title I funded or not Title I funded in regard to Brain-Based Learning strategies.

### **Research Questions**

The researcher examined Missouri public school teachers' perceptions of Brain-Based Learning Theory by addressing the following research questions utilized in this study:

RQ1: What are the differences in perceptions of third-grade male and female educators when applying the Brain-Based Learning Theory as reported by the Brain-Based Learning Survey Questionnaire (BBSQ)?

RQ2: What are the differences in the perceptions of third-grade educators when applying the Brain-Based Learning Theory as reported by the BBLSQ in schools which do and do not receive Title I funding?

Quantitative data was gathered to analyze the inferential statistics of the perceptions of third-grade educators whose principals indicated Brain-Based Learning strategies were implemented in their schools. Furthermore, to test the hypothesis, an independent samples *t*-test was utilized.

### **Null Hypotheses**

After the development of the research questions, the researcher hypothesized no differences between the perceptions of third-grade male and female educators regarding Brain-Based Learning strategies exist. Additionally, the researcher hypothesized no differences in the perceptions of educators regarding Brain-Based Learning strategies for schools which do and do not receive Title I funding would be evident. An investigation of the following null hypotheses was conducted to answer the research questions:

H<sub>0</sub>1: There are no statistical differences in the perceptions of third-grade male and female educators when applying Brain-Based Learning Theory as reported by the Brain-Based Learning Survey Questionnaire (BBLSQ).

H<sub>0</sub>2: There are no statistical differences in perceptions of third-grade educators when applying the Brain-Based Learning Theory as reported by the BBLSQ in schools which do and do not receive Title I funding.

Email was utilized by the researcher to distribute the Brain-Based Learning Survey Questionnaire (see Appendix A) to public school principals in the state of Missouri. The researcher did not include Missouri schools which operate as alternative,

charter, magnet, online, or private schools. Furthermore, only schools which implement Brain-Based Learning Theory were utilized in this study. The researcher first inquired with the principals to determine if their schools utilized Brain-Based Learning strategies. Principals who indicated participation in leveraging Brain-Based Learning strategies in their response were provided a Google Forms link for the third-grade educators to participate in the perceptual survey in reference to Brain-Based Learning strategies. If the school indicated participation of the use of Brain-Based Learning strategies and the school principal agreed with educators participating in the study, the principals were asked to forward the provided Google Forms link to building educators. After the third-grade educators completed the survey, the survey results were populated through Google Forms. Within the survey, the participants were asked for their consent to participate in the survey, provided the survey direction, and explained the confidentiality of the survey.

To examine each of the research questions presented, a quantitative analysis was performed by utilizing an independent samples *t*-test to determine if the null hypotheses were accepted or rejected. The researcher utilized an independent samples *t*-test to determine the significance of the differences between the means of the two groups identified in the research questions. First, the researcher used the survey data to explore the differences between third-grade male and female educators in how each viewed Brain-Based Learning strategies. Furthermore, an analysis of the perceptions regarding Brain-Based Learning strategies of third-grade educators working in Title I and non-Title I schools was performed to determine common themes and to draw further conclusions. Chapter Four provides the third-grade educator perceptual findings of Brain-Based

Learning strategies as well as demographics, findings from the null hypotheses, participants, and the conclusions of the study.

### **Data Analysis and Findings**

With surveys completed and the survey window closed, all responses were downloaded from Google Forms into an Excel document. The researcher then cleaned the data as necessary by deleting unused columns and information. Google Forms requires all survey questions must be answered prior to submitting the questions so the results did not contain any unanswered questions. If a participant attempted to complete the Brain-Based Learning Questionnaire Survey without answering all questions an error would result, thus, notifying the user of unanswered questions in the survey. Responses were grouped into the following sections: gender, Title I status, and the sum of the Brain-Based Learning Questionnaire Survey.

The participants in the study included third-grade teachers from public schools in the state of Missouri. The researcher contacted 94 Missouri public school principals via email to determine if the school utilized Brain-Based Learning strategies in the classroom. If Brain-Based Learning strategies were utilized, principals were asked to forward an email with the Google Form link with the Brain-Based Learning Survey Questionnaire (BBLSQ) to all third-grade teachers in their respective buildings. Results from the survey yielded 80 completed responses which represented 80 third-grade educators across the state of Missouri. The data received from third-grade educator respondents was analyzed to determine the perceptual differences of Brain-Based Learning between gender and between educators teaching at Title I or non-Title I funded schools. When completing the survey, participants were asked four initial questions. The

first question on the survey asked the participant to identify his or her gender, and the response provided the information for the researcher to analyze Research Question 1. The fourth question on the survey asked the participant if the school was Title I funded or not Title I funded, and the response provided the information for the researcher to analyze Research Question 2.

### **Gender Analysis**

The first question on the survey asked the participant to identify his or her gender, which provided the information needed to analyze Research Question 1. Based on the male and female gender group response, an independent sample *t*-test was conducted to analyze Research Question 1: What are the differences in perceptions of third-grade male and female educators when applying the Brain-Based Learning Theory as reported by the Brain-Based Learning Survey Questionnaire (BBLSQ)? Group statistics for Research Question 1 are on Table 2.

**Table 2**

*Group Statistics for Gender: Number, Mean, Standard Deviation, and Standard Error*

	Gender	<i>N</i>	<i>M</i>	<i>SD</i>	<i>SEM</i>
BBLSQ	Female	54	149.44	10.87	1.48
	Male	26	142.85	11.09	2.17

For Research Question 1, responses of third-grade male educators were compared to the responses of third-grade female educators. Data for Research Question 1 is shown in Table 3.

**Table 3**

*t-test for Gender*

	<i>t</i>	<i>df</i>	<i>Sig.</i>	<i>M</i> <i>difference</i>	<i>SEM</i> <i>difference</i>	<i>95% CI</i>	
						<i>LL</i>	<i>UL</i>
BBLSQ	2.57	78	0.01*	6.6	2.61	1.4	11.8

Note. CI=confidence interval; LL= lower limit; UL = upper limit.

\*  $p < .05$ , two-tailed

RQ1: What are the differences in perceptions of third-grade male and female educators when applying the Brain-Based Learning Theory as reported by the Brain-Based Learning Survey Questionnaire (BBLSQ)?

H<sub>0</sub>1: There are no statistical differences in the perceptions of third-grade male and female educators when applying Brain-Based Learning Theory as reported by the Brain-Based Learning Survey Questionnaire (BBLSQ).

The survey questions regarding Brain-Based Learning strategies were answered by 54 female and 26 male participants. An independent samples *t*-test was completed to determine if differences in the perceptions between third-grade male and female educators were present. The data assessed by inspection of a boxplot included no outliers. Brain-Based Learning scores for each gender were normally distributed, as assessed by Shapiro-Wilk's test ( $p > .05$ ). However, the homogeneity of variances was not assumed as assessed by Levene's test for equality of variances, but the test was still used because the independent samples *t*-test is fairly robust to deviations from normality. Therefore, the perceptions of Brain-Based Learning utilizing the Brain-Based Learning Survey Questionnaire were higher for third-grade female educators ( $M = 149.44$ ,  $SD = 10.87$ ) than third-grade male educators ( $M = 142.85$ ,  $SD = 11.09$ ), by a statistically significant

difference of 6.60 (95% CI, 1.40 to 11.80),  $t(78) = 2.57$ ,  $p < .01$ . A medium effect size existed with the Cohen's  $d = (142.85-149.44)/10.94 = 0.60$ . Thus, the null hypothesis (H0.2.a) was rejected.

### **Title I and non-Title I Analysis**

The fourth survey question asked respondents to indicate if the school the educator taught at was Title I funded or not Title I funded, thus providing information to analyze Research Question 2. Based on the Title I funded and not Title I funded school group response, an independent sample  $t$ -test was conducted to analyze Research Question 2: What are the differences in the perceptions of third-grade educators when applying the Brain-Based Learning Theory as reported by the BBLSQ in schools which do and do not receive Title I funding? Groups statistics for Title I and not Title I schools can be found in Table 4.

**Table 4**

*Group Statistics of Title I Funded Schools: Number, Mean, Standard Deviation, and Standard Error*

	Title I	<i>N</i>	<i>M</i>	<i>SD</i>	<i>SEM</i>
BBLSQ	No	44	147.25	11.61	1.75
	Yes	36	147.36	11.09	1.85

For Research Question 2, responses of educators working in Title I funded schools were compared to the responses of educators not working in Title I funded schools. Data for Research Question 2 is shown in Table 5.

**Table 5**

*t-test for Title I*

	<i>t</i>	<i>df</i>	<i>Sig.</i>	<i>M</i> <i>difference</i>	<i>SEM</i> <i>difference</i>	<i>95% CI</i>	
						<i>LL</i>	<i>UL</i>
BBLSQ	-0.04	78	0.97	-0.11	2.56	-5.2	4.98

Note. CI=confidence interval; LL= lower limit; UL = upper limit.

RQ2: What are the differences in the perceptions of third-grade educators when applying the Brain-Based Learning Theory as reported by the BBLSQ in schools which do and do not receive Title I funding?

H<sub>0</sub>2: There are no statistical differences in perceptions of third-grade educators when applying the Brain-Based Learning Theory as reported by the BBLSQ in schools which do and do not receive Title I funding.

The survey questions regarding Brain-Based Learning strategies revealed 44 participants did not work at a Title I school and 36 participants did work at a Title I school. An independent samples *t*-test was run to determine if differences in schools which were Title I funded or not Title I funded were present. The data assessed by inspection of a boxplot included no outliers. Brain-Based Learning scores for each group were normally distributed, as assessed by Shapiro-Wilk's test ( $p > .05$ ). However, the homogeneity of variances was not assumed as assessed by Levene's test for equality of variances but the test was still used because the independent-samples *t*-test is fairly robust to deviations from normality. Therefore, the perceptions of Brain-Based Learning utilizing the Brain-Based Learning Survey Questionnaire were similar for Title I schools ( $M = 147.25$ ,  $SD = 11.61$ ) than schools who are not Title I funded ( $M = 147.36$ ,  $SD = 11.09$ ), a *p*-value of .97 indicated there was no statistically significant difference of  $-0.11$

(95% CI, -5.20 to 4.98),  $t(78) = -0.04$ . An effect size close to zero with the Cohen's  $d = (147.36-147.25)/11.35 = 0.01$ . Thus, the null hypothesis ( $H_{0.2}$ ) was failed to be rejected.

### **Summary**

Chapter Four delivered the analysis and findings of the study. The researcher contacted 94 Missouri public school principals via email. Of the 94 school districts which were contacted, the survey yielded 80 completed responses representing 80 third-grade educators across the state of Missouri. Data was disaggregated by gender (male and female) and Title I (Title I and non-Title I) schools. The first and fourth questions on the survey were utilized to determine the demographics of the sample. The survey questions identified the gender of third-grade educators and the Title I status of the Missouri educator's public elementary school.

Two independent samples  $t$ -tests were conducted for Research Questions 1 and 2. Analysis of data revealed a statistically significant difference in the responses between the perceptions of male and female participants on the Brain-Based Learning Survey Questionnaire. The researcher further analyzed the data of Title I funded and non-Title I funded schools and found no statistically significant differences between Title I and non-Title I schools in responses between the perceptions towards Brain-Based Learning Survey Questionnaire existed. Independent sample  $t$ -tests were used to determine whether to reject each of the null hypotheses. The null hypothesis in Research Question 1 was rejected due to statistically significant differences found in the data analysis. Additionally, Research Question 2 had no statistical difference and the researcher failed to reject the null hypothesis for Title I school and non-Title I schools as well. Chapter Five provides a summary of the findings of the study and conclusion from the data is

drawn. Furthermore, Chapter Five also provides recommendations for further studies of Brain-Based Learning.

## CHAPTER FIVE

### CONCLUSIONS AND RECOMMENDATIONS

#### Introduction

In Chapter Five, the researcher discusses the results of the study by providing an interpretation and analysis of the methods used to collect and evaluate the data.

Additionally, the researcher includes a summary of the findings within the chapter to answer the research questions: “What are the differences in the perceptions of third-grade male and female educators when applying the Brain-Based Learning Theory as reported by the Brain-Based Learning Survey Questionnaire (BBSLQ)?” and “What are the differences in the perceptions of third-grade educators applying the Brain-Based Learning Theory as reported by the BBSLQ in schools which do and do not receive Title I funding?” Next, the researcher explores an in-depth discussion of the findings. The researcher also proposes implications to the profession of education and includes recommendations for future research to be conducted. Finally, the researcher concludes the chapter with discussion regarding the conclusions to the study based upon the findings, analysis, and integration of the data.

The purpose of this study was to compare the perceptions of third-grade educators applying Brain-Based Learning Theory in the classroom to determine the impact of gender and Title I funding on the perceptions of Brain-Based Learning. Teachers have an obligation to improve the learning of students and prepare students for future success. Education is a necessity to help students be successful and Brain-Based Learning is a strategy which can be implemented to potentially help a student’s ability to learn. Brain-Based Learning is described as a holistic approach to the brain, meaning the brain is

looked at as an orderly process, as a whole, rather than a sum of its parts (Bonomo, 2017). There are many similarities in regard to how the brain works and learns between the genders, however, the unique differences between the male and female brain were explored in this study. Jensen (2005) explained, Brain-Based Learning refers to teaching methods, lesson designs, and school programs which are based on the latest scientific research regarding how the brain works and learns, as well as cognitive development. Additionally, Brain-Based Learning examines how students learn differently as individual's age, grow, and mature socially, emotionally, and cognitively.

This research study sought to examine the importance of an educator's gender in their perceptions of Brain-Based Learning. Furthermore, research also attempted to show the value of Title I funding on the perceptions of Brain-Based Learning for third-grade educators. This quantitative study was conducted in an attempt to gain knowledge of third-grade educators' perceptual knowledge of Brain-Based Learning to claim if gender and Title I funding had an effect. Chapter Five includes a summary of findings, discussion of the results of the findings, professional implications, recommendations for future research, and the final conclusions of the study.

### **Summary of Findings**

The research was conducted to determine if a difference in the perceptions of third-grade male and female educators utilizing Brain-Based Learning existed. Further research was also conducted to determine if a difference in the perceptions of third-grade educators applying Brain-Based Learning, as reported on the Brain-Based Learning Survey Questionnaire (BBSQ), in schools which do and do not receive Title I funding was present. Although a significant amount of research has been conducted on Brain-

Based Learning, little information exists as to the significance of the educator's gender or the Title I funding status of the school on the educator's perspective of Brain-Based Learning. As a result of the literature reviewed, the researcher developed two research questions to analyze the different perceptions of third-grade male and female educators applying Brain-Based Learning. The perceptions, based upon the results of the Brain-Based Learning Survey Questionnaire, were leveraged to discover how an educator's gender and Title I funding would impact perceptions on the use of Brain-Based Learning in the classroom.

Once the period of time for third-grade educators to complete the survey concluded, the researcher gathered and calculated the survey results. The survey results revealed the rejection of the null hypothesis for Research Question 1. The rejection of Research Question 1 was due to the fact a statistically significant difference existed in the responses of third-grade male and female educators based upon their perceptions towards Brain-Based Learning. Additionally, the researcher explored how the perceptions of educators towards Brain-Based Learning would impact schools who do and do not receive Title I funding. The survey results revealed the researcher also failed to reject the null hypothesis. The failure to reject the null hypothesis was revealed by no statistical difference existing in educators' perceptions of Brain-Based Learning in schools which do and do not receive Title I funding.

### **Research Question 1 Conclusions: Gender**

The first research question to be answered was 'What are the differences in the perceptions of third-grade male and female teachers on applying the Brain-Based Learning Theory as reported by the Brain-Based Learning Survey Questionnaire

(BBSQ)?' To better comprehend the difference pertaining to the participants' perceptions of Brain-Based Learning Theory, the research question specifically included the gender of the third-grade educator. The results of the Brain-Based Learning Survey Questionnaire (BBSQ) were summed by gender and an independent sample *t*-test was performed on Research Question 1 to determine if a statistically significant relation ( $p < .05$ ) was identifiable. The results of the data revealed a statistically significant relation for the BBSQ. Although a statistically significant difference in responses between third-grade male and female educators existed,  $t(78) = 2.57, p < .01$ , when analyzing the effect size to determine the strength of Brain-Based Learning, a medium effect size with the Cohen's  $d = .60$  was revealed. Because Brain-Based Learning had a medium effect size, a difference in male and female educators' perception of how Brain-Based Learning Theory is applied was indicated. The literature review also stated variances existed among male and female brains, however, no evidence of how each gender utilizes Brain-Based Learning strategies in distinct ways was revealed. The data revealed from the results of the Brain-Based Learning Survey Questionnaire (BBSQ) indicated female educators had a higher overall perception of Brain-Based Learning and were more comfortable utilizing forms of Brain-Based Learning strategies. The researcher scrutinized the data to detect if any concerns for trustworthiness would be found while analyzing the process but none were found. After analyzing the data, the researcher rejected the null hypothesis.

The researcher indicated in previous chapters, a limitation to this study included the return rate of the respondents who were provided the survey link by their principal. Additionally, the overall number of surveys completed by respondents was a limitation as well. When comparing the representative population of respondents from this testing

group, only 54 female respondents and 26 male respondents completed the survey. The representative population resulted in a male representation of 32.5% of the population of the testing group and a female representation of 67.5%. Based on the total participation, more than half of the respondents were female.

### **Research Question 2 Conclusions: Title I and non-Title I Funded**

The second research question was ‘What are the differences in the perceptions of third-grade educators when applying the Brain-Based Learning Theory as reported by the Brain-Based Learning Survey Questionnaire (BBSLQ) in schools which do and do not receive Title I funding?’ To best understand the differences in Brain-Based Learning Theory, the research question contained which schools do and do not receive Title I funding as reported by the Brain-Based Learning Survey Questionnaire (BBSLQ). An independent sample *t*-test sample was performed on Research Question 2 to determine if a statistically significant relation was identifiable. Data analysis revealed for the BBSLQ, no statistically significant difference in responses between Title I and non-Title I,  $t(78) = -0.04$  were indicated. When analyzing the effect size to determine the strength of Brain-Based Learning, an effect size between the groups with the Cohen’s  $d = 0.01$  was not revealed. When an effect size in the study is not present, results explain no difference in the perceptions of educators working in Title I and non-Title I schools existed. The literature review does show a difference between Title I and non-Title I educators attributes, however, the attributes are not a factor in the perceptions of Brain-Based Learning for educators. Furthermore, after analyzing the data, the research failed to reject the null hypothesis.

The researcher indicated in previous chapters, limitations of the study included the return rate of the respondents who were provided the survey by their principal as well as the number of surveys completed by respondents. When comparing the representative population of respondents from the testing group, only 44 participants did not work at a Title I school and 36 participants did work at a Title I school responded to the survey. Therefore, the representative population resulted in 45% of educators working in Title I schools and 55% of the educators working in non-Title I funded schools. Thus, more than half of the respondents were non-Title I funded schools.

## **Discussion**

The results of the study indicated a significant difference in the perceptions of third-grade male and female educators when applying Brain-Based Learning Theory as reported by the Brain-Based Learning Survey Questionnaire (BBLSQ). The difference exhibited in the survey by the results indicate female educators had more knowledge regarding the application of Brain-Based Learning Theory in the classroom than male educators. Additionally, the Brain-Based Learning Survey Questionnaire (BBLSQ) was utilized to determine the difference in the perceptions between third-grade educators working in schools applying Brain-Based Learning Theory which do and do not receive Title I funding. The results of the study interpreted no statistically significant differences existed between the Brain-Based Learning Theory perceptions of third-grade educators in Title I funded and non-Title I funded schools.

Currently, the researcher was unable to find studies regarding how the gender of the educator alters perceptions and the implementation of Brain-Based Learning within the classroom exist. However, the findings which resulted from this study indicate a

female educator has stronger perceptions and knowledge of Brain-Based Learning. With female educator's scoring higher on the BBLSQ, a relationship could exist between the findings and female educator's implementation of Brain-Based Learning strategies in their classrooms at a higher rate. Male educators may not be comfortable with their knowledge regarding Brain-Based Learning and may have lower perceptions and implementation rate of Brain-Based Learning as a result. Brain-Based Learning has many facets and Jensen (2005) explains teachers need to understand the process of learning as it is central to effective teaching. An educator not well versed in Brain-Based Learning will not be able to implement Brain-Based Learning Theory strategies (Jensen, 2005).

Jensen's (2005) findings seem to support an educator's perceptions regarding Brain-Based Learning are ultimately what dictates the educators use of Brain-Based Learning strategies in the classroom. The perceptions and use of Brain-Based Learning in classroom are linked with an educator's knowledge and views of Brain-Based Learning. Thus, if male educators had a greater overall understanding of Brain-Based Learning and strategies implementing Brain-Based Learning in the classroom, scores on the BBLSQ could potentially be increased. Jensen's (2005) research found when an educator's perceptions of Brain-Based Learning improved, the overall instruction and student performance improved as well. Regardless of gender, as an educator's knowledge of Brain-Based Learning improves, their perceptions and implementation of Brain-Based Learning improves as well. Brain-Based Learning is based on utilizing strategies based on the body, mind, and brain research (Jensen, 2005). If separated, the body, mind, and brain "cannot break down the connections and affects students' abilities to go beyond what they learned, apply knowledge, and analyze patterns" (McNamee, 2011, p. 41). An

educator cannot fully comprehend the perceptions of Brain-Based Learning Theory if Brain-Based Learning has not been fully taught to an educator. Therefore, perceptions of Brain-Based Learning cannot be taught to students at full capacity (McNamee, 2011).

Additionally, the impact of Title I funding on teacher perceptions of Brain-Based Learning used in the classroom was found not significant. Based upon the survey results, the findings indicate educators, regardless of teaching in a Title I or non-Title I school, have similar perceptions and knowledge of Brain-Based Learning based upon the Brain-Based Learning Survey Questionnaire (BBLSQ) results. An educator's perception of Brain-Based learning is unique to the individual teacher based upon their own perceptions and knowledge of Brain-Based Learning. As described in the literature review, a formative assessment was researched by Mayer, Wiley, Wiley, Dees, and Raiford (2016) in Georgia and a relationship between students from a low-socioeconomic background with having less success in the classroom was identified. Title I funding can be used to provide resources and supplemental services for students. However, Title I schools have a difficult time retaining veteran teachers (Rodas, 2019). Additionally, teachers in most Title I schools are not as highly qualified when compared to teachers in non-Title I schools (Mayer, Wiley, Wiley, Dees, and Raiford, 2016). Furthermore, student achievement can be directly impacted by an educator's educational experience (Boyd et al., 2008; Clotfelter, Ladd, & Vigdor, 2006; Jennings & DiPrete, 2010; Wayne & Youngs, 2003; Wong, 2004). Title I funds can be utilized to support students and schools which receive Title I funding to help ensure quality veteran educators with knowledge of Brain-Based Learning are retained and supported through the use of Title I funds.

The limitations in this study were created to limit participants to only third-grade educators in the state of Missouri using Brain-Based Learning within their classroom. Also, the study relied on participants to answer the survey questions honestly regarding their perceptions, implementation, and knowledge of Brain-Based Learning. Furthermore, the number of respondents for the Brain-Based Learning Survey Questionnaire (BBLSQ) were fewer than anticipated. Fewer participants could be the result of the 2020 COVID-19 pandemic which disrupted the teaching profession by creating undue stress and increased work in comparison to other years.

Overall, the perspectives of the participants provided informational findings. The participants' perspectives can be utilized to gain a better understanding of educator's perspectives and knowledge of Brain-Based Learning in the classroom. Additionally, the results of the study could be transferred to other schools across the country to ensure educators are provided with opportunities to expand their knowledge and perceptions of Brain-Based Learning.

### **Professional Implications**

The intent of this study was to understand the perceptions of male and female educators and educators from Title I and non-Title I funded schools regarding Brain-Based Learning Theory. Little information exists regarding the effects of gender or Title I funding on an educator's perceptions regarding Brain-Based Learning. When analyzing the data, it was evident a statistically significant difference occurred between the perceptions of third-grade male and female educators. Evidence from the data exhibited male third-grade educators perceived Brain-Based Learning differently than third-grade female educators. In this study, third-grade male teachers did not perceive Brain-Based

Learning Theory as crucial when compared to third-grade female teachers. If third-grade male educators do not value Brain-Based Learning Theory as important, consequently, literacy skills may not be achieved as easily for students and student achievement may become hindered. Because male and female brains develop differently, recognizing differences between male and female brain function is important for educators to understand (James, 2015). Knowledge of brain function of males and females could be gathered by educators through the implementation of workshops or professional training events. The brain function awareness could be applied by an educator who understands male brains tend to focus better on single tasks and apply the knowledge when designing lessons. Although differences exist between the genders, the brain is still a complex organ which can adapt and integrate based on the environment and experiences. When analyzing the data, no statistical difference occurred between Title I and non-Title I funded schools. Evidence from the data demonstrated third-grade educators teaching at Title I and non-Title I funded schools perceived Brain-Based Learning no differently. In this study, third-grade teachers teaching at Title I funded schools did not perceive Brain-Based Learning Theory any differently than educators teaching at non-Title I funded school. Subsequently, administrators can gain the understanding Title I funds do not make a difference for Brain-Based Learning.

The findings of this research can be extremely valuable for education administrators to advance the practice of Brain-Based Learning Theory. Furthermore, results may help elementary educators analyze how to best educate their students, teach skills, and develop lessons. Contextually, the results may not only be valuable for third-grade educators, but also for administrators, students, and parents of students in

understanding the value of how a child's brain works and learns. Thus, administrators and policy makers in Missouri public schools should consider making a concerted effort to add programming for Brain-Based Learning as a requirement for preservice educators to have an understanding of the theory. Specifically, according to data from this study, educators across the grade levels should have an opportunity to have training with Brain-Based Learning. The results from this study can be valuable in affirming the mission of Missouri State public schools' learning practices.

As a result of the conclusions of this research, education administration should not only provide opportunities for teachers to participate in Brain-Based Learning, but also actively motivate students to take part in their learning. Students should learn about Brain-Based Learning and learn how to advocate for the best learning for their brains. Schools could leverage the data in this study by ensuring educators, regardless of gender, understand the importance of how students learn most efficiently. Furthermore, as an organization, it is important to put practices, procedures, and policies in place which support best practices. Providing training skills for Brain-Based Learning, encouraging educators to take part in workshops/conferences, providing sufficient time for educators to learn how to integrate Brain-Based Learning into their curriculum, and providing time for educators to collaborate with other grade levels are ways to support and encourage best practices. Although this study was limited to public schools in the state of Missouri, the results of the study are generalizable to similar states throughout the country as the professional implications could be utilizable to educational leaders throughout the country.

## **Recommendations for Future Research**

The following recommendations from the researcher may assist in future research studying the effects of gender or Title I funding regarding an educator's perceptions of Brain-Based Learning:

1. Further research should study the comparison between elementary school educators and middle school educators with the intentional instruction of Brain-Based Learning Survey Questionnaire. Further research could be used to gain a better understanding of how a variety of K-8 educators perceive Brain-Based Learning.
2. A replication of this study could be completed by adding an opportunity for qualitative or mixed methods responses from third-grade educators comparing their knowledge, beliefs, and practices of Brain-Based Learning. Such responses would allow a researcher to interview educators or other stakeholders to gain deeper understanding of the participants' knowledge, beliefs, and practices of Brain-Based Learning.
3. A replication of this study using private schools, charter schools, and alternative schools would enhance the field of study. Including various schools would open the study to a wider variety of participants for a better understanding of an educator's perceptions and use of Brain-Based Learning.
4. Further research should analyze Brain-Based Learning and how the strategies and implementation can impact the development of different grade levels within a school.

## **Conclusion**

The purpose of this casual-comparative study was to evaluate, from a purposeful sampling of third-grade educators, perceptions of Brain-Based Learning and how perceptions are influenced by gender and Title I funding. Participants in this study included Missouri public school third-grade educators whose schools participated in the use of Brain-Based Learning in the classroom. After the researcher confirmed the use of Brain-Based Learning at the school, a link to the Google Forms survey was provided to the school principal to send to third-grade educators to participate in the study. The quantitative results of this survey allowed the researcher to understand the differences between educator's perceptions of Brain-Based Learning based on gender and Title I funding. For this study, the researcher used a *t*-sample test to evaluate the perceptual differences between third-grade educators based on gender and Title I funding. Chapter Five described conclusions of the research, implications of the study, and recommendations for future studies.

In regards to Brain-Based Learning, the vast majority of previous research listed in Chapter two was centered around how the brain works, Brain-Based teaching strategies, and methods of teaching literacy. However, little to no research existed in regard to how a third-grade educator's gender or the Title I funding status of a school influenced perceptions of Brain-Based Learning Theory. Through quantitative results, this study indicated the gender of the educator is a factor which can be considered to provide the best Brain-Based Learning strategies for students. Furthermore, the quantitative results of the study did not exhibit Title I status of a school influencing the perceptions of Brain-Based Learning Theory.

Research acknowledged the importance of educators focusing on professional development to advance their knowledge of teaching strategies (Tran, Truong, Dinh, Do, Tran, & Phan, 2020). The continuous development of understanding Brain-Based Learning strategies allows educators to better teach their students and cater to each student's unique needs. The implementation of effective teaching strategies ensures students have better learning experiences (Hong and Milgram, 2008). With schools wanting to close the opportunity gap, districts should provide professional development to enhance the learning of Brain-Based Learning strategies to provide the best environment for student learning. Furthermore, as schools face pressure to increase student achievement on standardized testing, educators need to refine their skills on Brain-Based Learning strategies to be equipped to provide the best learning opportunities for their students. Based on the results of the survey, male educators have less of an understanding of the brain, so providing male educators with more professional development on Brain-Based Learning could have a positive impact in the classroom. According to Jenson (2005), teachers should be experts on the brain.

The gap in research may provide opportunities for improvement with Brain-Based Learning strategies for educators. Providing opportunities for educators to learn and implement Brain-Based Learning strategies in their classrooms can strengthen the effective learning strategies used by educators. Educators who understand how the brain works and learns are more equipped to provide teaching strategies which help students improve their academic achievements (Denton 2010; Shaywitz 2003). When effective teaching strategies are utilized, students are taught with their favored learning styles, educators are more self-assured in their methods and abilities, and the overall school

success is improved. A student's own frame of mind and the teacher's beliefs are large factors, which can influence student performance and development (Hong and Milgram, 2008). Educators need to learn and implement effective teaching strategies because educators not utilizing effective teaching strategies, due to unfamiliarity with strategies, lack of training for implementing strategies, or lack of support when trying to implement new strategies, may not have as many successful students (Williams and Coles, 2007).

## Appendix A

### Brain-Based Learning Survey Questionnaire

Advanced Statistics and Instrument Design  
Survey Instrument Assignment  
Diana Hsu

Dr. Joseph Sartorius  
Southwest Baptist University  
College of Education and Social Sciences  
Department of Graduate Studies

To: Third-grade teachers in Missouri,

I would like to thank you for sharing your perspective and for your help with my research. Without your help it would not be possible to help future students. Your survey responses will be confidential and all data collected remain anonymous.

In this study the researcher will learn about the perceptions of third-grade teachers on applying Brain-Based Learning Theory and how perceptions differ between genders and in schools which do and do not receive Title I funding.

Thank you again for your help. I appreciate everything.

Diana Hsu

#### BRAIN-BASED LEARNING SURVEY QUESTIONNAIRE (BBSLQ)

1. What is your gender?

Male

Female

2. How many years have you been teaching in education?

Less than 5

5-10

11-15

16-20

More than 20 years

3. Highest Degree Earned?

Bachelor of Science

Bachelor of Arts

Master's Degree

Ph.D./Ed.D.

Other (please specify) \_\_\_\_\_

4. Do you teach in a Title I funded school?

Yes

No

5. What curriculum/program are you using in your classroom?

Brain-Based curriculum

Lucy Calkins

Balanced Literacy

None of the Above

Please read the following definitions before completing the questions which follow:  
Brain-Based Learning is a learning approach which is more aligned with how the brain naturally learns best. Brain-Based Learning is a way of thinking about the learning process. It is learning with the brain in mind.

Brain-Based Learning provides for differences in learning and encourages students to learn with music, mind maps, role plays, journals, model building, movement, community projects, theater, art, etc. (Jensen, 2000).

Please indicate

- 1- Strongly Disagree
- 2- Disagree
- 3- Neither Agree or Disagree
- 4- Agree
- 5- Strongly Agree

(Knowledge of Brain-Based Learning)

6. I have sufficient understanding of how the brain learns.

(Please check one answer)

- 1 Strongly Disagree
- 2 Disagree
- 3 Neither Agree or Disagree
- 4 Agree
- 5 Strongly Agree

7. I am comfortable with the use of various learning strategies as part of my classroom teaching.

(Please check one answer)

- 1 Strongly Disagree
- 2 Disagree
- 3 Neither Agree or Disagree
- 4 Agree
- 5 Strongly Agree

8. I am knowledgeable about the use of providing frequent, non-judgmental feedback as a useful tool.

(Please check one answer)

- 1 Strongly Disagree
- 2 Disagree
- 3 Neither Agree or Disagree
- 4 Agree
- 5 Strongly Agree

9. I feel the need to be more adequately trained in the area of how the brain learns best.

(Please check one answer)

- 1 Strongly Disagree
- 2 Disagree
- 3 Neither Agree or Disagree
- 4 Agree
- 5 Strongly Agree

10. When evaluating students, I evaluate in a way that accounts for the fact that students learn differently.

(Please check one answer)

- 1 Strongly Disagree
- 2 Disagree
- 3 Neither Agree or Disagree
- 4 Agree
- 5 Strongly Agree

Please indicate

- 1- Never
- 2- Rarely
- 3- Occasionally
- 4- Often
- 5- Always

11. I pre-expose my students to content & context of a topic at least one week before introducing it.

(Please check one answer)

- 1 Never
- 2 Rarely
- 3 Occasionally
- 4 Often
- 5 Always

12. I have attended worthwhile workshops or conferences which dealt with the topic of a certain type of learning strategy.

(Please check one answer)

- 1 Never
- 2 Rarely
- 3 Occasionally
- 4 Often
- 5 Always

13. I have sought the advice of colleagues concerning the implementation of a certain type of learning strategy.

(Please check one answer)

- 1 Never
- 2 Rarely
- 3 Occasionally
- 4 Often
- 5 Always

14. I support the use of real-life, immersion-style, multi-path learning over traditional learning in my classroom.

(Please check one answer)

- 1 Never
- 2 Rarely
- 3 Occasionally
- 4 Often
- 5 Always

15. Our school has encouraged workshops, conferences, or in-service training on the topic of the newest strategies in classroom teaching.

(Please check one answer)

- 1 Never
- 2 Rarely
- 3 Occasionally
- 4 Often
- 5 Always

Please indicate

- 1- Strongly Disagree
- 2- Disagree
- 3- Neither Agree or Disagree
- 4- Agree
- 5- Strongly Agree

(Beliefs about Brain-Based Learning)

16. Different learning approaches are a waste of time in a school setting.

(Please check one answer)

- 1 Strongly Disagree
- 2 Disagree
- 3 Neither Agree or Disagree
- 4 Agree
- 5 Strongly Agree

17. The purpose in my classroom is to create a supportive, challenging, and complex environment where questions are encouraged.

(Please check one answer)

- 1 Strongly Disagree
- 2 Disagree
- 3 Neither Agree or Disagree
- 4 Agree
- 5 Strongly Agree

18. I view how students will learn best, more important than what should I teach.

(Please check one answer)

- 1 Strongly Disagree
- 2 Disagree
- 3 Neither Agree or Disagree
- 4 Agree
- 5 Strongly Agree

19. I feel how one learns, plays an important role in classroom learning.

(Please check one answer)

- 1 Strongly Disagree
- 2 Disagree
- 3 Neither Agree or Disagree
- 4 Agree
- 5 Strongly Agree

20. I would be more willing to initiate various learning strategies if there was more time to do so.

(Please check one answer)

- 1 Strongly Disagree
- 2 Disagree
- 3 Neither Agree or Disagree
- 4 Agree
- 5 Strongly Agree

21. Brain-Based Learning is a fad in education which will pass as many other so-called “reforms” have done.

(Please check one answer)

- 1 Strongly Disagree
- 2 Disagree
- 3 Neither Agree or Disagree
- 4 Agree
- 5 Strongly Agree

22. I believe I already do Brain-Based Learning in my classroom.

(Please check one answer)

- 1 Strongly Disagree
- 2 Disagree
- 3 Neither Agree or Disagree
- 4 Agree
- 5 Strongly Agree

23. I would be more willing to initiate Brain-Based Learning if I knew more about it.

(Please check one answer)

- 1 Strongly Disagree
- 2 Disagree
- 3 Neither Agree or Disagree
- 4 Agree
- 5 Strongly Agree

24. Brain-Based Learning is a very positive way to learn.

(Please check one answer)

- 1 Strongly Disagree
- 2 Disagree
- 3 Neither Agree or Disagree
- 4 Agree
- 5 Strongly Agree

25. I feel all schools should know how to implement Brain-Based Learning.

(Please check one answer)

- 1 Strongly Disagree
- 2 Disagree
- 3 Neither Agree or Disagree
- 4 Agree
- 5 Strongly Agree

(Practices of Brain-Based Learning)

26. It is not important to practice various learning strategies in my classroom.

(Please check one answer)

- 1 Strongly Disagree
- 2 Disagree
- 3 Neither Agree or Disagree
- 4 Agree
- 5 Strongly Agree

27. I should teach all my students the meaning and purpose of various styles of learning.

(Please check one answer)

- 1 Strongly Disagree
- 2 Disagree
- 3 Neither Agree or Disagree
- 4 Agree
- 5 Strongly Agree

28. I have been successful; therefore, I will not change my teaching strategy.

(Please check one answer)

- 1 Strongly Disagree
- 2 Disagree
- 3 Neither Agree or Disagree
- 4 Agree
- 5 Strongly Agree

Please indicate

- 1- Never
- 2- Rarely
- 3- Occasionally
- 4- Often
- 5- Always

29. I am willing to change my teaching style.

(Please check one answer)

- 1 Never
- 2 Rarely
- 3 Occasionally
- 4 Often
- 5 Always

30. I utilize some form of Brain-Based Learning strategy (e.g. students: drawings, charts, lists, dialogues, actions, demonstrations, debates, or mind-maps) on a weekly basis.

(Please check one answer)

- 1 Never
- 2 Rarely
- 3 Occasionally
- 4 Often
- 5 Always

31. I use new and updated information in all my education classes.

(Please check one answer)

- 1 Never
- 2 Rarely
- 3 Occasionally
- 4 Often
- 5 Always

32. It is important to demonstrate and show educators new ways of teaching.

(Please check one answer)

- 1 Never
- 2 Rarely
- 3 Occasionally
- 4 Often
- 5 Always

33. I use the newest technology in my classroom.

(Please check one answer)

- 1 Never
- 2 Rarely
- 3 Occasionally
- 4 Often
- 5 Always

34. I currently attend educational conferences and workshops about the latest trends in education.

(Please check one answer)

- 1 Never
- 2 Rarely
- 3 Occasionally
- 4 Often
- 5 Always

35. I use or encourage some form of movement in my classroom to help with focus, attention, or learning readiness.

(Please check one answer)

- 1 Never
- 2 Rarely
- 3 Occasionally
- 4 Often
- 5 Always

36. I view movement, relaxation, and cross lateral stretching as a valid form of readiness for learning.

(Please check one answer)

- 1 Strongly Disagree
- 2 Disagree
- 3 Neither Agree or Disagree
- 4 Agree
- 5 Strongly Agree

37. I encourage my students to use some form of cross lateral movements or crossing the midline for concentration or thinking skills.

(Please check one answer)

- 1 Never
- 2 Rarely
- 3 Occasionally
- 4 Often
- 5 Always

38. I feel that movement, relaxation, and cross lateral stretching should play an important role in classroom learning.

(Please check one answer)

- 1 Strongly Disagree
- 2 Disagree
- 3 Neither Agree or Disagree
- 4 Agree
- 5 Strongly Agree

39. I feel that drinking water is a very important aspect which enhances learning.

(Please check one answer)

- 1 Strongly Disagree
- 2 Disagree
- 3 Neither Agree or Disagree
- 4 Agree
- 5 Strongly Agree

40. I use or encourage some form of movement in my classroom to help with focus, attention, or learning readiness.

(Please check one answer)

- 1 Strongly Disagree
- 2 Disagree
- 3 Neither Agree or Disagree
- 4 Agree
- 5 Strongly Agree

41. I feel movement, relation, and cross lateral stretching should play an important role in classroom learning.

(Please check one answer)

1 Strongly Disagree

2 Disagree

3 Neither Agree or Disagree

4 Agree

5 Strongly Agree

THANK-YOU VERY MUCH FOR YOUR TIME FOR COMPLETING THIS  
SURVEY!

## Appendix B

### Research Review Board

September 24, 2020

Re: A Quantitative Study on Third Grade Educators' Perceptions of Brain-Based Learning Based on Gender and Title I Funding

Dear Ms. Hsu ,

On September 24<sup>th</sup>, 2020 a review of your application and supporting documents for the above named research proposal was completed. The Research Review Board (RRB) for Southwest Baptist University has determined that the proposed research project meets the criteria for Exempt status as per policy 1.15.3 (A.1) in the faculty guidelines. As per the above policy "If the project is certified exempt, the principle investigator need not resubmit the project for continuing RRB review as long as there are no modifications in the exempted procedures". The study has now been approved, therefore, work on the project may begin.

If any modifications to the exempted procedures are made, the RRB will need to complete a new review of the changes to determine if the project remains Exempt or if further review is necessary.

Congratulations on the approval of your project, we wish you well during its completion. If you have any questions regarding the RRB's decision, please contact me at [sxmorrow@sbuniv.edu](mailto:sxmorrow@sbuniv.edu).

Sincerely,

Suzie Morrow, DNP, RN, CNE  
Southwest Baptist University  
Research Review Board, Chair



## Appendix C

### Principal Email Consent

Dear Principals,

My name is **Diana Hsu** and I am a doctoral student with Southwest Baptist University located in Bolivar, Missouri. I am an ESOL specialist in the Ladue School District. To complete my studies and dissertation, I am researching perceptions of teachers, who utilize Brain-Based Learning. The results of this study will review the teacher's perception concerning their knowledge, beliefs, and practices of Brain-Based Learning. Additionally, this research will review how gender and Title I funding affect the teacher's perception of Brain-Based Learning.

The following "yes" or "no" question asks if you or your third-grade educators participate in Brain-Based Learning at your school. If you respond with "yes", indicating you do participate in Brain-Based Learning, I am kindly requesting you forward the provided [survey link](#) to your third-grade teachers. If there is additional approval necessary for third-grade teachers to participate in the survey please forward the contact information to me. [BBLSQ Survey](#)

The survey will take teachers approximately 10-15 minutes to complete. Responses to this survey are confidential and the information gathered is not identifiable. The survey has a total of 40 questions. Questions are divided into five sections including: background information, knowledge, beliefs, practices of Brain-Based Learning, and teacher demographics. A copy of the survey is attached if you would like to review it. I have also attached the letter of consent for teachers to participate in the survey. If you could please request your teachers to have this finished by **Friday, October 16, 2020**, it would be much appreciated.

If you have any other questions you may contact me by email [\*\*dh4x56@gmail.com\*\*](mailto:dh4x56@gmail.com). The completed study will be available through ProQuest Dissertations or through Southwest Baptist University. I appreciate your consideration and help in gathering information regarding this study.

Thank you for your time,

Diana Hsu

Doctoral Student at Southwest Baptist University, Bolivar, Missouri

## Appendix D

### Informed Consent to Participate

#### CONSENT TO PARTICIPATE IN A QUANTITATIVE STUDY ON THIRD-GRADE EDUCATOR'S PERCEPTIONS OF BRAIN-BASED LEARNING BASED ON GENDER AND TITLE I FUNDING

You are asked to participate in a research study conducted by **Diana Hsu**, a student enrolled in the doctoral Educational Administration program at Southwest Baptist University and an ESOL Specialist at Ladue School District. You are invited to participate in this research project because you are a third-grade teacher. The purpose of this research project is to identify the perceptions of teachers concerning the knowledge, beliefs, and practices of Brain-Based research. You have been asked to participate in this survey because your school participates in Brain-Based Learning research.

Your participation in this research study is voluntary. You may choose not to participate or skip any question you are not comfortable in answering. If you decide to participate in this research survey, you may withdraw at any time. If you decide not to participate in this study or if you withdraw from participating at any time, you will not be penalized.

The procedure involves completing an online survey which will take approximately **10-15 minutes**. As this is an online survey, participants can complete the survey in the location of choice. Your responses will be confidential, and no identifying information such as your name, email address, or IP address will be collected. The questions presented in the survey are focused on understanding teacher perceptions concerning the knowledge, beliefs, and practices of Brain-Based research. The questions are designed to solicit information regarding the differences between third-grade educators, male and female educators, and Title I and non-Title I funded schools.

Data gathered will be completely confidential. All data will be stored in a password protected electronic format. To help protect your confidentiality, the surveys will not contain personally identifying information. The results of this study will be used for scholarly purposes only.

If you have any questions or concerns about the research study, please contact **Diana Hsu dh4x56@gmail.com**. You may also contact the RRB for questions or concerns regarding the study at rrb@sbuniv.edu. This research was approved by the RRB on September 24, 2020.

Clicking on the “agree” button below indicates that:

- You have read the above information.
- You have voluntarily agreed to participate.

- You are at least 18 years of age.

If you do not wish to participate in the research study, please decline participation by clicking Exit Survey.

## Appendix E

Use of your BBSLQ Survey > Dissertation x



**Diana Hsu** <dh4x56@gmail.com>  
to sklinek ▾

Mon, Aug 31, 2020, 10:01 PM ☆ ↶ ⋮

Hello Dr. **Klinek**,

I am a doctoral student at Southwest Baptist University completing a dissertation in Leadership Education. I am writing to ask written permission to use the Brain-Based Learning Survey Questionnaire in my research study.

My research being conducted is a quantitative study on third grade educators' perceptions of Brain-Based Learning focused on gender and Title I funding. My research is being supervised by my professor, Dr. Joe Sartorius.

I happened upon your dissertation on Brain-based Learning: *Knowledge, beliefs, and practices of college of education faculty in the Pennsylvania State System of Higher Education* and was hoping you would let me use your survey, BBSLQ, for my dissertation? If so, is there a possibility I can modify or adapt your questions to fit my purpose of my research?

I plan to use this survey in 92 districts in Missouri who have 3rd grade educators. I plan to focus the results of the survey to determine the differences between the perceptions of male and female 3<sup>rd</sup> grade educators that use Brain-Based Learning. Additionally, I want to focus on the perceptions of those educators that do or do not receive Title I funding. My dissertation will be completed by the end of this year.

I would like to use your BBSLQ under the following conditions:

- I will use the BBSLQ only for my research study and will not sell or use it for any other purposes
- At your request, I will send a copy of my completed research study to you upon completion of the study and/or provide a hyperlink to the final manuscript

If you do not control the copyright for these materials, I would appreciate any information you can provide concerning the proper person or organization I should contact.

If these are acceptable terms and conditions, please indicate so by replying to me through email at [DH4X56@gmail.com](mailto:DH4X56@gmail.com).

Sincerely,

Diana Hsu



**Klinek, Shelly Rae** <SKLINEK@pitt.edu>  
to me ▾

Tue, Sep 1, 2020, 4:52 PM ☆ ↶ ⋮

Hi! Yes.... you absolutely can use my questionnaire and modify it to how you want.

Good luck!



**Dr. Shelly Klinek**, CAPE, CWP  
Director of Health & Physical Education  
University of Pittsburgh at Bradford

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