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A SYSTEMATIC LITERATURE REVIEW OF SCHOOL LEADERSHIP INTELLIGENCES
FOR THE DEVELOPMENT OF NEURO-EDUCATIONAL LEADERSHIP

By

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Abstract

The purpose of this study was to systematically examine primary research about the integration of school leadership intelligence and effective leadership practices. Neuroscience as it relates to school leadership is an emerging topic in the field of education. The conceptual framework for this study was focused on three areas of intelligences and their relationship to applied neuroscience. The theoretical foundations were derived from Goleman's emotional intelligence, Glasser's conversational intelligence, Ang and Van Dyne's cultural intelligence, and Thorndike and Stein's social intelligence. The theoretical underpinnings for each intelligence was aligned to Rock's SCARF Model (status, certainty, autonomy, relatedness, fairness). A systematic literature review was conducted to draw conclusions of how the principles of neuroscience, leadership practices, and theories of intelligence could explain the importance of an individual's SCARF position for overall effectiveness. The researcher describes the relationship between leadership effectiveness and school leadership intelligence and its role in increasing employee engagement, motivation, and productivity. Keyword searches in databases and educational journals were used to narrow the primary research meeting the inclusion and exclusion criteria. A content analysis method from Rock's SCARF Model was used to code the content and conduct the analysis. Conclusions were drawn using research findings on neural networks for problem solving and decision making, emotion regulation, facilitating change, and influencing and collaborating with individuals.

University of New England

Doctor of Education
Educational Leadership

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DEDICATION

Today is the day my family and I can celebrate generational achievement. For generations, my great-great grandmother (who lived to be 108 years old), my great grandmother (who lived to 105 years old), and my grandmother (who was days shy of 106 years old) prayed that, if not in their lifetime, in their children's lifetime, they would be blessed. I thank my great great grandmother, Hannah Lucinda Moser, my great grandmother, Sarah Isabella Smith, my grandmother, Ruth May Kennedy, and my mother, Joyce Elizabeth Pope, for instilling in me unconditional love for all humankind. It was through their sweet spirits, I learned to appreciate the smallest gifts of life from the natural Earth and, as a result of their joy and gladness, I aspire to embrace the beautiful wonders of the Earth. To my brother, Howard Pope, thank you for always being there for me, mom, grandma, and great grandma. You are the best brother in the world. You love your family so much that you will go far and beyond the call of duty when someone needs you. To my nephew, Arc Gabrielle Pope, I am so proud of you for completing Kindergarten and achieving in the upper percentile on your achievement exams, placing you above first grade in the exceeding proficiency category. To my son, Levi Masterson, I love you. God allows U-Turns. You have always loved me, and I know, you always will. Finally, to my mother, Joyce Pope, you have always supported me, uplifted me, and encouraged me to do my personal best. As a child, I enjoyed emulating you as I watched you script documents, using shorthand or typing 60 words per minute, using the old fashion ribbon and electric typewriter. Mom you were always so smart and intelligent. You worked hard your entire life, raising two children without any support. I love you for instilling a love of learning in me and, because of you, I am achieving this accomplishment today.

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CHAPTER 1

INTRODUCTION

Researchers in the field of neuroscience are redefining leadership in the 21st century by adding new meaning to the neural basis of leadership effectiveness for leading the self, others, and an organization that is known for its triple focus for effectiveness (Pink, 2013). Neuro-leadership practitioners assert that understanding the neural basis of leadership effectiveness can be accomplished by understanding the neuroscience of social behavior for engagement, motivation, and maximum performance. The 21st century leader needs neuro-leadership skills to build relationships, to regulate emotions, to make decisions, and to motivate others to achieve organizational goals to meet the demands of closing achievement gaps and responding to changing populations (Leithwood & Jantzi, 2005).

Statement of the Problem

The study of neuroscience and its relation to leadership has been an interest of many researchers for decades as they search for a framework that drives leader and organizational effectiveness. According to Leithwood and Riehl (2005), leadership is difficult to define. In fact, many practitioners and research scholars have tried to define leadership for nearly a century; however, to date, they have not reached a consensus (Northouse, 2016). The study of neuroscience and its impact on human behavior response systems pushes practitioners in the field of educational leadership to dig deeper to assess human dynamics and their impact on shaping the culture and drive of an entire organization. Educational leaders have the potential to connect brain science to tap into other people's talents, and to develop and train the brains of other people through effective communication by using their school leadership intelligence

(SLQ), which is defined as using a high level of social, emotional, and cultural intelligences.

For more than 50 years, educational researchers and leaders have sought solutions to address common issues across public school districts concerning economic disparity, changing demographics, achievement gaps, and cultural proficiency. In 2016, the United States Department of Education revisited the 50th anniversary of the Coleman Report (Hanushek, 2016), "*Equality of Educational Opportunity*," and concluded that, after half of century, the findings on race relations indicate the achievement gap has barely narrowed since the 1964 Civil Rights Act, which prompted a call for school equality. Hanushek (2016) described the current achievement gap, after 50 years, a "national embarrassment" (p. 1). Regarding these findings, educational leaders of the future will be faced with even greater challenges in narrowing the achievement gap as school systems continue to experience economic disparity and demographic changes. These systemic changes will require SLQs and strategies to motivate and influence others positively to change their behavior and practices to meet the needs of all students.

Purpose of the Study

The purpose of this study was to systematically examine the empirical research on school leadership effectiveness that is aligned to one or more forms of intelligences that are comprised of social, emotional, cultural intelligence and will be collectively defined as SLQs. The aim of this systematic literature review was to begin the groundwork for the development of a neuroeducational leadership model for school leadership effectiveness in the 21st century. In this review, the researcher aspired to inform the development of neuro-educational leadership graduate programs and professional development training to prepare school leaders to use their SLQ to increase workplace engagement, motivation, and performance.

Research Question

The following research question guided the systematic literature review:

What is the scope and composition of the literature on the social, emotional, and cultural SLQs (School Leader Intelligences) and the neuroscience of school leadership effectiveness aligned to the domains of applied neuroscience?

Conceptual Framework

The conceptual framework for this study was focused on three areas of intelligences (social, emotional, and cultural) and their relationship to the study of social and cognitive neuroscience (see Figure 1). Theoretical foundations are derived from the works of Goleman's (2010) emotional intelligence, Glasser's (2015) conversational intelligence, Ang and Van Dyne's (2008) cultural intelligence, and Thorndike and Stein's (1937) social intelligence. Liang (1998) stated that an organization that could organize around intelligence would have a leader with the right mindset and ability to adapt in a complex system, using individual and collective intelligence. Rock and Ringleb (2013) added that collective intelligence explains the level of performance within a group according to the collective social sensitivity (reading and understanding the emotional states of others). Liang (1998) explained that the cognitive or neuropsychological aspects of the mind are significantly related to human behavior at the neural level. Therefore, determining the relationship between the brain's neural activities and behavioral response will be a focal point for understanding the impact that school leaders have on influencing organizational effectiveness. The neurally-aware leader has knowledge and understanding of the thinking brain and social-emotional brain. The brain circuitry of making decisions, identifying problems, using strategies, analyzing situations, and identifying a potential problem will be analyzed, using empirical evidence on SLQs for organizational effectiveness.

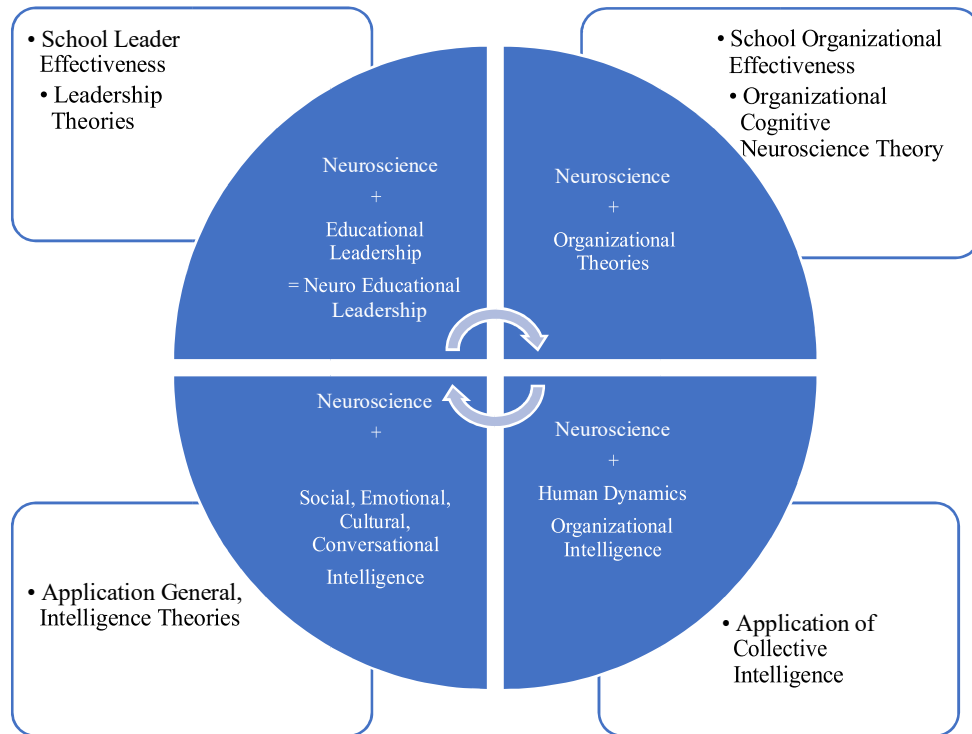


Figure 1. Neuro-educational leadership framework.

Goleman's (2010) work on the eight primary emotions of fear, anger, disgust, shame, sadness, surprise, joy or excitement, and love or trust drives the search for researchers to answer the question: How can leaders use emotional intelligence to lead effective organizations? Rock and Ringleb (2013) explained how emotional intelligence could be incorporated into leadership training programs by emphasizing the importance of leaders learning how to build trust and connectedness for effective collaborative.

However, most leadership programs do not focus on collectively building the emotional, social, and cultural capacities of leaders. Rock and Ringleb (2013) explained trust is an emotional state that influences organizational success. To explore the connectedness between trust, emotions, and leadership theories, Rock and Ringleb (2013) developed an emotional epistemological theoretical framework so that participants could examine their own emotional role in practice and consider how their emotions and reactions influence their decision-making process.

The research supporting the emotional intelligent framework of Goleman's (2010) work was supported by literature reviews that were related to brain research and by the leader's ability to reason rationally, while understanding the other person's emotional state when making important decisions. Rock and Ringleb (2013)) explained the importance of leaders understanding the neural circuitry of their mental processes for making decisions because their decisions are constantly influenced by personal thoughts and feelings. Sprenger (2010) stated that effective visionary leaders could consciously find a way to share and achieve their goals and visions by accessing different parts of people's brains. Rock and Ringleb (2013) believed that leaders who understand the social circuitry and reward circuitry of the brain could influence workplace performance and productivity by understanding people's responses to the environment or thought processes (or mentalizing state) within an organization.

Glaser (2014) believed that effective communication is also a form of intelligence and identified conversational intelligence as the ability to understand how to activate empathy, trust, integrity, and good judgement when interacting with people. Conversational intelligence activates neurochemicals in the brain that controls the executive functions in the prefrontal cortex and influences the decision-making process in the brain (Glaser, 2014). In addition, conversational intelligence allows one to reinforce relationships with others and process different levels of an individual conversation. It is important to understand how trust and distrust can affect worker performance. When leading a team of individuals, displaying and modeling integrity are essential for building trust and workplace engagement. Sprenger (2010) stated that, if leaders' action and behaviors do not match their values and beliefs, followers would perceive the leader as untrustworthy.

Carter (2019) explained that, when individuals on a team train and collaborate, a strong social bond is formed which causes the release of the neurotransmitter oxytocin, the feel-good

chemical in the brain, creating trust among the team. The proponents of the somatic marker theory suggest that emotions are a significant part of the decision-making process and say that the theory explains the holistic analysis of the emotion–decision-making relationship.

“Specifically, somatic marker theory asserts that decision making incorporates a multitude of brain areas involved in emotion (amygdala, ventromedial PFC [Prefrontal Cortex]) and memory (hippocampus, dorsolateral PFC)” (Rock & Ringleb, 2013, p. 46). Oxytocin is the social glue for increasing the feeling of belongingness. When bringing about change facilitation, it is important to elicit positive feelings in everyone by increasing the release of the neurotransmitter oxytocin.

Consciousness of interactions with individuals can heighten conversational intelligence and the level of leadership. According to Glaser (2014), the three different levels of conversation that occur between individuals can influence positive or negative emotions. Conversational intelligence allows one to move from an I-centric to a *we*-centric level. According to Glaser, I-centric conversational leadership is self-centered, which leads to increased threat responses in followers’ amygdala, the fight or flight emotional center of the brain. When leaders use *we*-centric conversational leadership, they increase bonding, motivation, and trust among their followers. The three levels of conversational intelligence are

1. Transactional – Confirming what we know,
2. Positional – Defining what we know, and
3. Transformational – Discovering what we do not know (Glaser, 2014).

Conversational intelligence provides important background information about the social mechanisms needed to understand the neural basis of connecting and synchronizing the leadership of self with others to move an organization effectively towards excellence. The application of conversational intelligence to developing 21st century leadership skills provides additional insight into what happens at the neural level of decision making. A 21st century

leader's ability to navigate and understand the three levels of conversation can influence a positive organizational culture built on trust and connectivity (Glaser, 2014).

A leader who is accepted by cultural strangers and feels comfortable in quickly assimilating and embodying his or her practice and customs has a high cultural intelligence (Dyne et al., 2008). Cultural intelligence is a 21st century leadership skill that allows individuals to cross boundaries comfortably because of their ability to decipher unfamiliar actions and gestures and their ability to be attuned to the cultural code (Dyne et al., 2008). The 21st century leader must have a keen sense to analyze his or her own organizational culture and subculture to interpret the behavior and emotions of followers. Mosakowski (2016) stated that cultural intelligence is related to emotional intelligence, but it picks up where emotional intelligence leaves off. A person with high cultural intelligence can somehow tease out of a person's or group's behavior those features that would be true of all people and all groups (p. 28).

The skillful school leader uses his or her school leadership intelligences to bridge cultural gaps effectively by using relational transparency to make other people aware of different cultural backgrounds and to celebrate cultural differences in the school organization.

Rockstuhl et al. (2013) explained that the culturally intelligent leader has the brain circuitry to solve complex social cultural problems that require higher order cognitive processing to make sense of situations within an organizational environment. The culturally aware leader demonstrates leadership effectiveness when he or she can understand and minimize the impact on followers of his or her own cultural biases and behaviors in the workplace to increase trust, motivation, performance, and engagement.

Delimitations and Assumptions

When leaders understand how social, emotional, and cultural interactions affect the self, others, and the organization, leaders will be able to make decisions using general intelligences

(social, emotional, cultural, conversational) to drive effective organizational outcomes (Goleman, 2016). Over the last 10 years, an increasing number of researchers have studied the integration of the field of neuroscience, leadership, and general intelligence theories (social, emotional, cultural, conversational, collective, and organizational) to explain the need for new leadership models, leadership development, and leadership practices.

As the fields of leadership, education, organizational management, and neuroscience merge, a paradigm shift is taking place in the 21st century for effective leadership practice focused on relational behaviors between leaders and followers and the need for collective intelligence to drive organizational effectiveness (Ringleb & Rock, 2008).

Not all scholars and researchers are convinced that this new paradigm shift of using neuroscience with leadership will develop leadership effectiveness. Lindebaum and Zundel (2013) argued that the neuroscience evidence to inform organizational effectiveness and leadership development is misaligned. Lindebaum and Zundel believed that the integration of neuroscience with leadership would not change brain patterns and would not improve the relational and social behavior between a leader and follower. In addition, Tallis (as cited in Vidal, 2012) coined the term *neuromania*, arguing that using natural science to explain leadership effectiveness should not solely focus on an individual's ability to activate areas of the brain to regulate emotion.

In fact, Ringleb and Rock (2008) indicated that fMRI research data cannot be used to address leadership development because the experimental behavioral task is recorded in control environments where

Using fMRI, social cognitive neuroscience experiments seek to identify the brain region or regions involved in a process of interest – essentially, where the brain “lights up” when engaging in a specified social psychological process. There can be no face-to-face

interactions with fMRIs-research subjects must keep their heads absolutely still during imaging and cannot speak. (p. 3)

Skeptics including Tallis (as cited in Vidal, 2012) and Lindebaum and Zundel (2013) believe that leadership practice and leadership development could not be address using brain science and fMRI research data to inform leadership effectiveness. However, the field of neuroscience has challenged the field of organizational management and is adding new meaning to organizational and leadership effectiveness. The study of neurochemical mechanisms and their impact on the human body response system pushes practitioners in the field of organizational development and educational leadership to dig deeper to assess and understand human dynamics and its impact on shaping the culture of an entire organization.

Significance of the Study

Neuroscience and school leadership has become important to researchers studying the leader's impact on setting organizational direction, developing people, and redesigning the organization through effective change initiatives. In this comprehensive review, the researcher introduces a framework to expand the body of literature on cultural, emotional, conversational, and social intelligences and its association with neuro-educational leadership and organizational effectiveness.

Definition of Terms

Applied neuroscience. The application of neuroscience research to understand human behavior is termed applied neuroscience.

Conversational intelligence. The ability to regulate conversations using a three-dimensional approach to shift mindsets and elicit positive emotions is termed conversational intelligence.

Cultural intelligence. The discernment of the behavior of others in a group or individuals by understanding different cultural perspectives is termed cultural intelligence.

Emotional intelligence. The awareness of emotions in oneself and others is termed emotional intelligence.

Interpersonal skills. The ability to engage with others using active listening and empathy.

Neuroscience. The neurochemistry, structure, and function of the brain and nervous system are called neuroscience.

Social intelligence. The application of self-awareness and social awareness or intrapersonal and interpersonal competencies in social settings is termed social intelligence.

Social neuroscience. The interdisciplinary understanding of biological and social processes in relation to behavior is termed social neuroscience.

Conclusion

Before the 1980s, few researchers focused on the integration of neuroscience or brain science in education. The work of Gardner's multiple intelligence theories opened a new branch of study in the field of education and student achievement (Pink, 2016). Most studies on leader effectiveness focus on the skills, practices, and behaviors of leaders and their impact on student achievement outcomes. However, many models of educational leadership are focused only on direction setting, developing individuals, and organizational change with little emphasis on relational behavior. With increasing interest in understanding the applicability of neuroscience to educational leadership, the aim of the researcher in this systematic literature review was to lay the groundwork for developing a neuro-educational leadership model by completing a comprehensive review of existing studies on educational leadership and neuroscience (Rock, 2008). The comprehensive review included keyword searches in databases and educational

journals. Hence, the goal of the researcher in this study was to conduct a systematic literature review of educational leadership models to reveal the interconnectedness of neuroscience for leader and organizational effectiveness.

From the literature, the researcher framed the study around clarifying the strands of neuro-leadership (Ringleb & Rock, 2008) within an educational organization and the interconnectedness of cultural, emotional, and social intelligence for school leadership effectiveness. In Chapter 2, the literature review, the researcher focuses on the emergence of neuroscience with leadership that has given rise to the field of organizational cognitive neuroscience. The specific skills, knowledge, and behaviors that are centered on relatedness, trust, commitment, and collaboration are identified, coded, and analyzed in Chapter 3, the methodology. Chapter 4 contains the data analysis of the empirical research on SLQ (school leadership intelligence). summarizes the key findings for SCARF behaviors aligned to the applied neuroscience competencies of decision making and problem solving, collaborating and influencing, regulation of emotions, and facilitating change.

CHAPTER 2

LITERATURE REVIEW

The integration of neuroscience and leadership has given rise and birth to a new field of organizational neuroscience and neuro-leadership. The application of brain science to understand human behavior in an organization has opened conversation and debate among researchers and practitioners in the fields of organizational management, education and leadership. There continues to be an interest to understand the relevance of neuroscience to organizational effectiveness based on one's cultural, social, and emotional awareness of influencing human behavior.

Emergence of Brain Science and Leadership

The birth and rise of the field of cognitive neuroscience is credited to Piaget (1936) a psychologist who studied child development, Miller (2003) a psychologist who studied human memory constraints, and Gazzaniga (2000) a psychologist who professes to be the “founding father of the cognitive neuroscientific fraternity” (Lee, Senior, & Butler, 2012a). Piaget (1936), Miller (2003), and Gazzaniga (2000) are pioneers of the emergence of brain science and leadership. Rock's (2013) research of integrating neuroscience with leadership would not have been possible without the work of these psychologists.

As a result, brain science and biology are of great interest to organizational and educational researchers who seek to understanding the symbiotic relationship between organizational and leadership effectiveness (Lee et al., 2012a). As the fields of education and neuroscience continue to merge, debate continues regarding how brain science influences the cognitive processes of human behavior. Butler, O'Broin, Lee, and Senior (2016) identified the study of human biology, management, organizational development, and its influence on human

behavior, mental processes, and effectiveness as the field of organizational cognitive neuroscience (OCN).

The field of OCN also known as, organizational neuroscience, gave rise to the study of social and cognitive neuroscience that is now expanding into the field of academia and leadership. Although the field of organizational neuroscience is growing, the literature review analysis indicated limitations in research designs and samples sizes, presenting challenges in aligning leadership research with neuroscience applications to understand organizational and leadership behavior. However, efforts are being made in the OCN field as researchers continue to conduct research on leaders' decision making, emotional regulation, and ethical reasoning aligned to institutional challenges and human interactions (Waldman, Volk, & Becker, 2011).

Neuroscience researchers are learning more about the physical responses to the way that information flows and is processed in a social context because of individuals biochemical, neurochemical, and electrochemical response in the body. Thus, they are understanding better the interplay between the brain and its influence and impact on human interactions and cultural differences within organizations. The challenge for 21st century leaders is knowing how to skillfully use collective intelligence and general intelligences (social, emotional, cultural, conversational) to keep teams performing at an optimal level for organizational effectiveness, using the applications of applied neuroscience.

Neuro-leadership

Rock (as cited in Ringleb & Rock, 2008) introduced the field of neuro-leadership to the fields of leadership and organizational management, defining neuro-leadership as an interdisciplinary field of leadership and management practices that explores the neural processes of human behavior, using the subfields of neuroscience, social cognitive and affective neuroscience, to improve leadership effectiveness in organizations. Applied neuroscience is the

application of brain science to understand the brain-behavior relationship and the neurochemistry of the brain. Researchers in the field of neuro-leadership seek to understand positive and negative human interactions through the lens of social knowledge about the thoughts, feelings, and intentions of the self and others, and goal directed behavior. The integration of neuroscience and leadership helps leaders to understand how the brain's circuitry for insight and intuition minimizes threat responses and maximizes reward responses to increase motivation, positivity, and workplace engagement. According to Rock and Ringleb (2013),

Effective leadership is in large part defined by the leader's ability to perceive, identify, understand, and successfully manage both his or her emotions and the emotions of others. Effective leaders' harness and direct the power of emotion to build trust and improve follower satisfaction, morale, and motivation, and thus enhance overall organizational effectiveness. (p. 51)

Neuro-leadership gives school leaders an opportunity to understand the behavioral response motivators for employee commitment and engagement. The leader's ability to create an environment in which positivity occurs by knowing how to influence the release of positive happy hormones and neurotransmitters in the brain requires triple focus leadership: leading the self, others, and the organization. Social awareness and self-awareness require a range of brain networks. The leader's ability to understand how to adapt and modify behavior of the self, others, and the organization using insight, intuition, and sense making is using a form of social, emotional, and cultural intelligence. Shearer and Karanian (2017) identified the primary regions and subregions of the brain that are used for intelligence. When viewing the fMRI regions of the brain for self-awareness and social awareness, the parts of the brain involved are as follows:

1. the anterior cingulate cortex that registers rejection in social situations and generates

- actions for correction in social situations,
2. the medial prefrontal cortex is considered the executive functioning center to control emotions in social settings,
 3. the motor cortex is responsible for physical actions of controlling self,
 4. the temporoparietal junction is responsible for monitoring the self in relation to the world, the posterior temporal sulcus helps the self to understand his or her presence in relation to the world, and
 5. the amygdala is responsible for fight or flight response, along with the insula (Carter, 2019).

Cognitive, Social, and Organizational Neuroscience

Miller (2003) and Piaget (1936) are considered by many authors to be the leading researchers who have studied the relationship between the mind and the brain (Lee et al., 2012a; Miller, 2003; Vaclair & Perret, 2003). However, Miller (2003) and Gazzaniga (2000) developed the operational definition of cognition in relation to one's social environment through their empirical research analysis (see also Lee, Senior, & Butler, 2012b). Using Miller's (2003) and Gazzaniga's (2000) research of memory, emotion, and language systems, and the molecular understanding of how behavior is governed by biology and psychology, the authors each concluded that one's knowledge system is dependent on one's memory system and social environment (Lee et al., 2012a).

The application of cognitive neuroscientific techniques to the study of social cognitive neuroscience led to the emergence of the field of social cognitive neuroscience, which continued to expand as researchers searched for its relevance to organizational effectiveness. A key component in leadership and organizational effectiveness is one's ability to manage behavior in

the workplace through the study and application of social behavior and cognitive neuroscience. Therefore, the analysis of work-based leadership approaches within an organization can be studied using applications of OCN (Senior, Lee, & Butler, 2011).

Lee et al. (2011) explained that an association exists between social cognitive neuroscience and organizational cognitive neuroscience. Lee et al. (2012a) said:

Organizational cognitive neuroscience is applied social cognitive neuroscience. Here social behavior is studied in the very domain by which it is defined. The organizational cognitive neuroscientific study of leadership is therefore one example of many that that can demonstrate the utility of completely closing the gap between the natural ecology of the phenomena of interest, and the way it is studied. (p. 3)

Organizational cognitive neuroscience infuses the subfields of neuroscience, organizational management, and leadership to bring together potential methodologies to investigate organizational workplace issues (Lee et al., 2012a). Organizational cognitive theory focuses on the neural, social, and cognitive mechanisms when studying the intersection between human social behavior and organizational manifestations (environmental stressors) and behavior (Lee & Chamberlain, 2007). The ability to adapt when faced with turbulence, negative influences, and experiences in an environment is the result of the brain's physiology and ability to adapt to a wide range of scenarios as the results of the brain's evolutionary development.

Effective Leadership

Effective leadership is considered a critical factor to the success of most organizations. However, leadership effectiveness can be difficult to define because of the varying perspectives and approaches to leadership. According to Northouse (2016), "Researchers from the behavioral approach have not been able to identify a universal set of leadership behaviors that would consistently result in effective leadership" (p. 91). When defining effective leadership, the

conceptualization, classification, and at least 65 dimensions of leadership must be taken into consideration to derive its meaning (Northouse, 2016, p. 2). For example, when defining effective leadership from the trait approach perspective, intelligence is a trait that contributes to a leader's ability to use social judgment skills effectively to problem-solve complex scenarios (Northouse, 2016).

Emotional intelligence is an important construct of the trait approach and leadership ability. Northouse (2016) said, "People who are more sensitive to their emotions and the impact of their emotions on others will be leaders who are more effective" (p. 12). Mayer, Caruso, and Slovey (2000) developed the Emotional Intelligence Test (MSCEIT) to measure the affective domains of emotions and the cognitive domains of thinking as a tool to understand how individuals' reason and manage their emotions.

However, Stogdill (1948, 1974), Mann (1959), Lord DeVader and Alliger (1986), and Kirkpatrick and Locke (1991) contributed to identifying important leadership traits, narrowing these traits to five major categories, including intelligence, determination, integrity, self-confidence, and sociability. In addition, Zaccro, Kemp, and Bader (2004, as cited in Northouse, 2016, p. 26) defined social intelligence as a major leadership trait and one of the most important attributes of leadership effectiveness.

In the behavioral leadership approach, effective leadership is not clearly defined by a set of consistent universal behaviors; therefore, it fails to support the theory that effective leadership is high task and high relationship. Yet, the Leader–Member Exchange Model is focused on relatedness between the leader and follower by which communication or conversational exchanges are met with mutual trust, respect, and commitment because of effective leadership. Applied neuroscience is the application of research to understanding behavior, perception, memory, consciousness, and the neurochemistry of the brain. Glaser (2014), coined the term

conversational intelligence, explaining the importance of leaders understanding how neurotransmitters in the brain transmit electrical signals from one nerve to another and the impact they have on building trust. Glaser (2014) stated, “Communication that takes place at the chemical level far outweighs the communication that takes place at the verbal levels” (p. 79). To be an effective leader, one must understand the neural circuitry of how information is processed between oneself and leading others.

Northouse (2016) defined culture as “learned beliefs, values, rules, norms, symbols, and traditions that are common to a group of people” (p. 428). According to Northouse (2016), leadership effectiveness can also be defined as understanding how to relate to individuals from different cultures, while leading for equality and not superiority. According to Carter (2019), theory of mind “refers to the instinctive ‘knowledge’ that other people may hold different beliefs than one’s own, and that those beliefs, not facts of a situation, that inform and determine their behavior” (p. 139). The belief system in the brain is activated by the emotional and reward center of the brain, consisting of anterior cingulate cortex, where beliefs are engaged, the ventromedial prefrontal cortex where rewards are processed, and the insula where feelings occur (Carter, 2019). As schools become more diverse, the need for understanding the interconnectedness of change is becoming more important for educational leaders. The process of developing a culture of high expectations in which followers have a sense of certainty, the school leader must focus on the school environment to develop the required behaviors for high performance needed from people.

Merging Neuroscience with Leadership

The merging of leadership and neuroscience creates new pathways for leaders to understand how to adapt and modify their leadership approaches and behaviors to become effective practitioners because of the neuroplasticity of the brain (Dimitriadis & Psychogios,

2016). The literature on leadership approaches that are aligned with OCN include the trait approach, the skills approach, the leader–member exchange approach, servant leadership, conceptualizations of complex and adaptive leadership, transformational leadership, and ethical forms of leadership (Waldman & Balthazard, 2015). Dimitriadis and Psychogios (2016) proposed a holistic approach to understanding brain leadership in organizations by coining the term *brain adaptive leadership* by which leaders focus on how individuals think, feel, and act within the organized social environment of an organization. Dimitriadis and Psychogios (2016) claimed,

Our thought patterns, analytical skills, moods, emotional reactions, habits, relation building and communication skills, our ability to change fast and to understand others fast, our overall influence and persuasion power, and almost anything else you can come up with concerning leadership can be traced back into the brain. (p. 1)

Integration of Social, Emotional, and Cultural Neuroscience on Leadership

Social neuroscience is the study of the integrations of social structures, human relationships, and the biology, genetic, hormonal, and neural mechanisms of behavior. A subfield of social neuroscience incorporates the study of empathy and general relationships of social, emotional, and cultural intelligences (Cacioppo, 2002; Çak Esen, Caluser, & Swain, 2015; Decety, 2009; Norman, Hawkey, Cole, Berntson, & Cacioppo, 2012). Ringleb and Rock (2008), researchers in the field of social cognitive neuroscience, covered topics such as emotional regulation, empathy, social connection, social rejection, self-awareness, decision making, and theories of mind (p. 2). The study of emotional neuroscience stems from researching the neurobiological correlates of emotion, motivation, and cognition. Norman et al. (2012) at the Endocrinology Neuroscience Lab for Social Emotional Neuroscience at Vanderbilt University embarked upon understanding the relationship between external pressures like stress and social

interaction. They believed that the study of social emotional neuroscience might provide insight to understanding human dynamics and effective leadership practices within organizational settings. In addition to the social–emotional aspect of neuroscience, the field of cultural neuroscience bridges the gap between the interdisciplinary field of studying culture, the physiological response to verbal and nonverbal social cues, and cognition (Cacioppo, 2002).

How the field of neuroscience can benefit what drives a leader’s behavior might be dependent on variables such as traits communication and trust. Waldman et al. (2011) argued that other leadership determinants could be factored into one’s leadership style when considering the cognitive processing and functions of the brain. Waldman et al. (2011) explained the limitation of psychometrical assessments and inter-rater reliability in relation to effective forms of leadership. Waldman et al. (2011), stated, “Leadership assessment based upon neurological variables may provide a more ecologically sound alternative, or at least addition, to psychometric assessment” (p. 3). Researchers are exploring how to use neuroscientific principles to understand better leadership behavior. Waldman et al. (2011) noted many reasons that researchers and theorist should have a foundational understanding of neuroscience in relation to leadership, including understanding the relationship of cognition, emotions, and moral reasoning when leading a group of individuals.

Merging Neuroscience With Leadership Models Debate

The field of OCN is a new interdisciplinary field of study; therefore, associated with it are many concerns and debates regarding its relevancy and effectiveness to the fields of organizational development, management, and leadership. Therefore, an in-depth analysis of the literature must be conducted. Increasingly, researchers are becoming interested in how adults make decisions, and much of the early research stems from the early 1990s from the field of neuroeconomics (Ward, Volk, & Becker, 2015). Interest in brain science is increasing; therefore,

the field of organizational neuroscience has sparked the brain science neuro-movement, sometimes referred to as the cognitive revolution (Butler et al., 2016; Ward et al., 2015). However, Ward et al. (2015) claimed, “It is time for the field to move beyond these debates to focus on applying neuroscience to further theory development and reveal more comprehensive answers to research questions of importance to both academics and practitioners” (p. 3). Butler et al. (2016) conducted an analysis of empirical research, spanning 2007–2014, to isolate the various methodological approaches that have contributed to the field of OCN. Butler et al. accomplished this task by narrowing the methodologies to the following key word searches: hormones (i.e. testosterone), neuroimaging, EEG, facial morphology, fluctuating asymmetry.

The review procedure used to conduct an empirical study and to analyze literature associated with the field of OCN consisted of five stages of research. Stage 1 resulted in an analysis of 657 articles, using the following keyword search terms: cognitive neuroscience, management, and organization science. These keyword findings were subdivided into two main categories: cognitive neuroscience and evolutionary psychology. In Stage 2, the articles were narrowed to 57 articles, using specific decision criteria referencing cognitive neuroscience as it is applied to organizational science and management. Stage 3 consisted of a snowballing process to ensure that important information was not missed during Stage 2. Finally, Stages 4 and 5 resulted in a deep analysis of methodologies used to generate themes focused on organizational behavior, thereby, bringing the total number of articles to 40 for analysis (Butler et al., 2016).

Butler et al. (2016) concluded that the field of OCN needs more scientific research that would stretch beyond their research themes and analysis of the field of economics, marketing, and organizational behavior. Furthermore, they stated that their review “has revealed that, while there is clearly significant interest, there remains less empirical research”. The difficulty of empirical collaboration in the OCN space is likely to have been an indicator of such scarcity and

it is heartening to see empirical work continuing to emerge even in the face of such difficulties. Many controversies exist around the methodological approach used to record human behavior and the decision-making processes. Butler et al. (2016) noted that some researchers believe that it is not possible to record all of the aspects of a human's decision-making process primarily because of the limitation of recording subjects in authentic and natural environmental settings (Giere, 2006). In addition, large sample sizes along the magnitude of a thousand are not common in neuroimaging studies.

However, some scientists argue that large sample sizes are not convenient when comparing research finding from neuroimaging tools such as fMRI. However, researchers and scientist are hopeful in moving the field of OCN by using open access databases such as the Open fMRI project (2017), allowing scientists and researchers around the world to access neuroimaging data to study large datasets for statistical brain mapping. As more research is conducted, the field of organizational cognitive development is growing, giving researchers and theorists a platform to further the field of leadership practice and organizational effectiveness.

Conclusion

Cultural neuroscience integrates research theory and methods from the fields of anthropology, cultural psychology, and cognitive sciences (Ang et al. 2013). This emerging field will help researchers understand the bidirectional relationship between cultural traits (values, beliefs, and practices), and behavioral mechanisms (neural processes) when developing culturally appropriate environments (Chio et al., 2010). The field of neuroscience has challenged the field of organizational management and is adding new meaning to the change formula in the 21st century. The study of neuroscience and its impact on the human behavior pushes practitioners in the field of organizational development and educational leadership to dig deeper to assess and understand human dynamics and its impact on shaping the culture of an

organization. To build collective intelligence within an organization or team, it is important that future leaders move through the 21st century with an understanding of how leadership approaches influence organizational effectiveness (2014).

It is important that 21st century leaders know how to help followers navigate through the change process. Northouse (2015) explained, “Adaptive leadership is about how leaders encourage people to adapt to face and deal with problems, challenges, and changes” (p. 257). Therefore, organizational neuroscience is about the leader understanding the principles of brain science so that he or she can help followers navigate through organizational complexities, using collective approaches to problem solving challenges in the workplace. To build collective intelligence and a psychologically safe work environment, it is important for leaders to understand how to use OCN to assess the progress towards organizational goals. It will be to a leader’s advantage if he or she understands the integration of neuroscience principles and leadership theories to build cultures of collective intelligence that encourage achievement and commitment from his or her followers and leaders. The several theories that drove this research included (a) selective moral disengagement theory (Bandura, 2002), (b) social cognitive theory (Bandura, 1991), (c) conversational intelligence theory (Glaser, 2014), and (d) organizational theory (Mayo & Woolley, 2016). Understanding these theories will help school leaders to use the principles of neuroscience to change the neuroplasticity of adult learners, trust their colleagues, and commit to achieving results.

CHAPTER 3

METHODOLOGY

In this study synthesis, the researcher explored a conceptual approach to understanding how effective school leadership practices could lead school change initiatives through the development of organizational intelligence using the principles of applied neuroscience and SLQ. This was accomplished by studying the relationship of effective school leadership practices and the integration of social, emotional, cultural, and conversational intelligences, which is collectively defined as SLQ. The emergence of a multidimensional intelligence approach to school leadership effectiveness is needed as school districts experience changing demographics in their school systems.

Purpose of the Study

The purposes of this narrative synthesis are as follow: (a) to study the relationship between effective school leadership practices and SLQ comprised of one or more of the following forms of intelligence: social, emotional, cultural, and conversational intelligences, which will be collectively defined as SLQ using applied neuroscience; and (b) to define the field of neuro-educational leadership.

The underpinnings for SLQ and effective leadership practices were analyzed for coding, using applied neuroscience competencies (Juhro & Aulia, 2017), and Rock's (2013) SCARF Model to show the interrelationship of neuroscience and school leadership. In this systematic literature review, the researcher informs and supports the need for a neuro-educational leadership model to develop school leaders for effective change in addressing economic disparity, achievement gaps, and changing demographics in public school systems.

Research Questions

The following research question guided the systematic literature review:

What is the scope and composition of the literature on the social, emotional, and cultural SLQs and the neuroscience of school leadership effectiveness aligned to the domains of applied neuroscience?

Conceptual Framework for Systematic Review

A new educational leadership model and educational leadership programs must be developed to train school leaders to increase their influence on organizational change and collective intelligence through the application of applied neuroscience. This goal can be accomplished by shifting leadership practices from a “static” state of leading to a “dynamic” state of leading. The competencies of applied neuroscience were introduced by Juhro and Aulia (2017) and Rock (2013) in the SCARF Model for organizational engagement, collaboration and positive behavioral influence were used to develop coding themes for data extraction and analysis of several primary studies.

In this study synthesis, the researcher uncovers and analyzes the neuroscience behind the way that school leaders can create productive school environments through the understanding of SLQ, educational leadership practices, and the application of applied neuroscience. Using exhaustive search methods, the researcher sought to answer the questions:

1. What does it mean for a school leader to lead his or her school environment intelligently, using effective leadership practices?
2. Why is do school leaders need to lead their school organization with school leadership intelligence?

Rock (2013) defined SCARF as follows:

S = One's sense of importance or rank relative to others in a group,

C = Clarity and adherence to vision, goals, and objectives,

A = Control over workflow and destiny,

R = Sense of safety and belonging in a group, and

F = A perception of morality and integrity.

School leadership effectiveness strands were aligned with Rock's (2013) SCARF Model for coding purposes (see *Figure 2*).

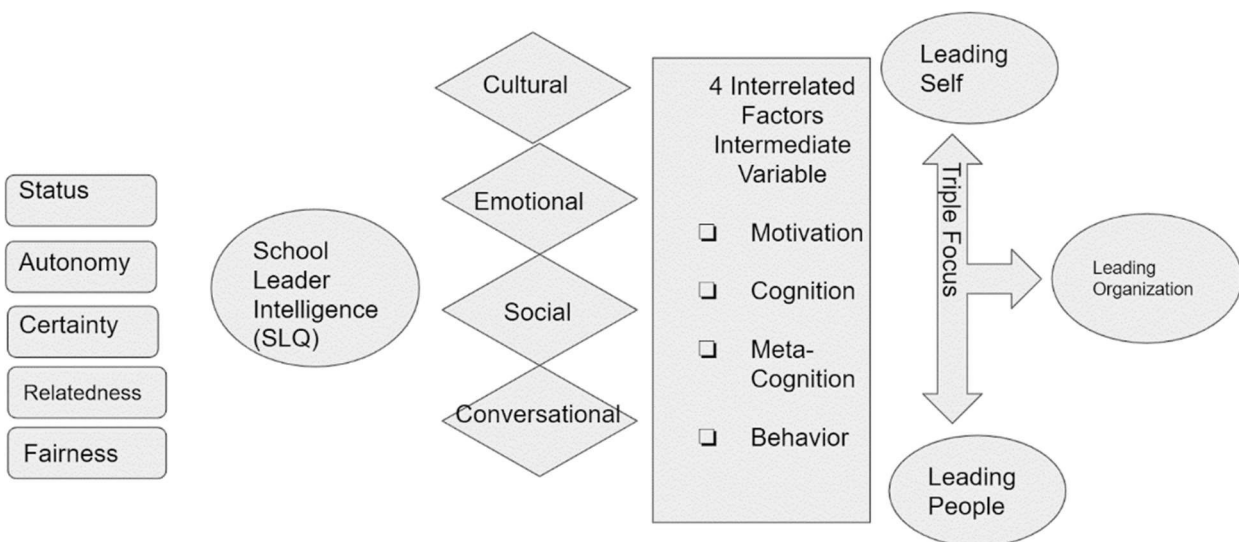


Figure 2. School leadership intelligence (SLQ) results in leadership effectiveness.

Method

A systematic literature review on neuroscience, SLQ, and educational leadership practices was conducted, using a content analysis method. A systematic process was used to analyze trends in books, research articles, publications and bibliographic data to draw conclusions about neuro-educational leadership models (Gumus, Bellibas, Gumus, & Hallinger, 2019). In addition, a content analysis method was used to code systematically themes from multiple sources, using topic-grouping methods from research methodology and theoretical underpinning (Gumus et al., 2019).

Coding Process

The SLQ measures (social, emotional, conversational, and cultural) were coded for each study using Rock's (2013) SCARF Model. For thematic coding purposes, the five subfields of Rock's SCARF Model were organized into a long table crosswalk matrix. The crosswalk was used to identify the different aspects of leadership effectiveness in relation to SLQ. The crosswalk matrix was used for data extraction and coding. Conclusions were drawn to explain how the application of applied neuroscience improves leadership effectiveness in relation to SLQ.

Data Analysis

An analysis of the total number of studies published in journals and databases was recorded. A combination of keyword phrases was searched through the analysis of research titles, abstracts, and key terms using database software. To ensure research reliability, the keyword phrases were checked twice to ensure related keywords phrases were incorporated in the literature search in preparation for coding and categorizing of keywords and phrases. The data table outlines the analysis of studies found in journals and databases on educational leadership models and neuroscience.

All of the studies' titles, abstracts, and keywords that fit the inclusion and exclusion criteria were analyzed. The author, educational leadership model, and neuroscience connection were identified for the bibliometric analysis. Studies meeting the inclusion and exclusion criteria underwent a content analysis to identify methodologies, purpose, and neuroscientific connections.

The following databases and journals were searched to identify relevant studies associated with the school leadership and the neuroscience of cultural, emotional, and social intelligences: Google Scholar, ERIC, PsycInfo, Scopus, Dissertations and Theses–ProQuest,

School Effectiveness and School Improvement, School Leadership and Management, American Education Research Journal, Educational Management Administration and Leadership, Journal of Educational Administration, and Educational Administration Quarterly.

The search was conducted from November 2017 until March 2018 and focused on literature written between 2008 and 2018. The following key words and combinations were searched and recorded in Table 1: “neuroscience leadership,” “leadership effectiveness,” “educational leadership,” “school leadership models” “cultural neuroscience,” “social cognitive neuroscience,” “emotional neuroscience,” “social neuroscience,” “trait leadership” “transformational leadership,” “adaptive leadership,” “authentic leadership,” “self-awareness,” “organizational effectiveness,” “neuro-leadership,” “social intelligence,” “emotional intelligence” “cultural intelligence” “trust,” “commitment,” and “collaboration.”

Table 1

Search Strategy Documentation

Keyword search	Keywords searched	Database 1	Database 2	Journal #1	Journal #2
Date					
Results 1					
Results 2					
Results 3					
Results 4					
Combined search limits					
Total minus duplicates					

The results of the number of hits obtained from each source were recorded in data tables (see Tables 2 and 3 for literature results search between November 2017 to March 2018). All of the studies were further sorted into categories, according to the experimental models (qualitative, quantitative), and scored using reporting criteria to classify the quality of the assessment, using study vote-count method (see Table 4).

Table 2

Database Literature Search Results

Database	Number of Studies
ERIC	
Google Scholar	
PsycInfo	
Scopus	

Table 3

Journal Literature Search Results

Journal database	Search results
Number of journal studies found	
Dissertations and theses from ProQuest	
School effectiveness and school improvement	
School leadership and management	
American Education Research Journal	
Educational Management Administration and Leadership	
Journal of Educational Administration	
Educational Administration Quarterly	

All of the studies were further sorted into categories, according to the experimental models (qualitative, quantitative), and scored using reporting criteria to classify the quality of the assessment and using study vote-count method (see Table 4).

Inclusion Criteria

Studies collected for this literature review were guided by the following inclusion criteria:

1. The study was focused on school leadership effectiveness.
2. The study included a form of SLQ (cultural, emotional, conversational, or social).
3. The study population was teachers of students in Kindergarten, and primary and secondary grades through Grade 12 (K–12) both public and private.
4. The publication period was January 2008 and March 2019.
5. The method of study was to use qualitative and descriptive data.

The following procedure and checklist in Table 4 were used to assess the quality of each empirical study.

Table 4

Study Reporting Criteria

Study reporting criteria	Author, year	Author, year	Author, year
Background	X		
<input type="checkbox"/> Research method justification	X		
<input type="checkbox"/> Literature review background	X		
<input type="checkbox"/> Research question <input type="checkbox"/> Study objectives			
Methods			
<input type="checkbox"/> Description of methods for data analysis			
<input type="checkbox"/> Method for survey administration			
<input type="checkbox"/> Data collection location			
<input type="checkbox"/> Contact numbers and types of contact			
<input type="checkbox"/> Description of methods for replication			
<input type="checkbox"/> Reliability evidence			
<input type="checkbox"/> Validity evidence			
<input type="checkbox"/> Data entry method verification			

Sample size

Study reporting criteria

Author, year

Author, year

Author, year

- Calculation of sample size
 - Representativeness
 - Sample size selection method
 - Population description
-

Research tool

- Description of research tool
 - Description of how research tool was developed
 - Scoring methods
-

Results

- Results presented
 - Results aligned with objectives
 - Results are clearly described
-

Response rates

- Response rate included
 - Explanation of how results calculated
 - Discussion of bias
 - Accounting of respondents
-

Study reporting criteria

Author, year

Author, year

Author, year

Interpretation and discussion

- Findings interpreted and discussed
 - Conclusion and recommendations for future research
 - Study limitations
-

Ethics and disclosure

- Signed consent
 - Research ethic approval
 - Evidence of ethical treatment
-

The journals were grouped according to the area of research (leadership style, intelligence (social, emotional, cultural, and conversational). The findings from the studies were placed in

Table 5 and were ranked as follows, using a 3-point scale that indicated the quality of the study and how well it met the criteria: 1 (high quality) if it met all of the criteria, scoring a quality assessment score of 90% or above; 2 (medium quality) if the study ranked 74.5% to 89.9%, indicating that it did not meet all of the reporting criteria as indicated for a score point of 1; and 3 (poor quality) if a study had a criterion ranking of 74.5% or below, according to the quality study assessment checklist in Table 4.

Table 5

Reporting Criteria and Classification of the Quality of Research Studies

Author, year	Leadership model and approach	Vote-count evidence (1–3)	Code and theme intelligence (SEC) neuroscience underpinnings

Note. 1 = insufficient; 2 = moderate; 3 = strong.

The vote-count procedure to assess the quality of the study was scored as follows:

- **High quality score point, 1** – (90% and above on reporting criteria checklist). Quantitative analysis, clear focus of study, background provided, planned method, validated measures, participant adequate for sample population, data analysis and statistical methods clearly outlined results present, response rates present, interpretation and discussion present and ethics and disclosure present.
- **Medium quality score point, 2** – (80%–74.5%). Study focus limited, background provided is limited, methodology vague, limited measures, limited number of participants, limited data analysis, limited results, limited response rates, limited discussions, limited ethics and disclosure.

- **Poor quality score point, 3** – (74.4% and below). Study significantly lacks both high quality and medium quality reporting criteria.

Institutional Review Board

In this systematic review, the researcher used 11 primary studies that included one or more multiple intelligence forms comprised of social, emotional, and cultural intelligence to examine school leadership effectiveness and to define the field of neuro-educational leadership. The University of New England requires approval from the Institutional Review Board for nonhuman subject research. On July 11, 2019, this systematic literature was approved for exempt status by the Institutional Review Board committee of the University of New England (see Appendix C).

CHAPTER 4

RESULTS

The purpose of this narrative synthesis was to (a) study the relationship between effective school leadership practices and SLQ comprised of one or more of the following forms of intelligence: social, emotional, and cultural intelligences, which was collectively defined as SLQ; and (b) to define the field of neuro-educational leadership for aspiring and existing school leaders. The underpinnings of leadership effectiveness and applied neuroscience were coded to show the relationship of neuro-educational leadership for effective change. In this systematic review, the researcher sought to inform and support the development of a neuro-educational leadership model that would support existing and aspiring school leaders striving to use SLQ for effective change.

As Cooper (2017) noted, the process of conducting a systematic literature review has been less than linear, as planned in the Chapter 3 methodology section of this study. The initial data collection strategy had to be changed because of the limited empirical findings that connected the relationships of cultural, social, and emotional intelligences and effective leadership practices within K–12 schools in the United States, including international studies in the search criteria. As Hallinger (2012) noted, “In an exhaustive search[;] the reviewer combs a wide range of possible sources in an attempt to identify potentially relevant studies”. The process of synthesizing primary studies to analyze the relationship between school leadership effectiveness and SLQ (social, cultural, emotional, conversational), using the four domains of applied neuroscience, required redefining the inclusion and exclusion criteria to form a literature “database” (Hallinger, 2012). The literature database identified in Chapter 3 was narrowed further because of discoveries encountered during analysis of each primary study.

In this study, the relationship between school leadership effectiveness and SLQ was examined by employing the work of the *National Board Certification for Educational Leaders: Accomplished Principal Standards* (National Board for Professional Teaching Standards [NBPTS], 2010). The research on the interconnectedness of social, emotional, cultural, and conversational intelligences was aligned to the underpinnings of neuro-leadership as Rock (2013) defined them in the SCARF model and the neuro-leadership domains of applied neuroscience. The researcher hypothesized from the previous research studies that SLQ is significantly correlated to school leadership effectiveness.

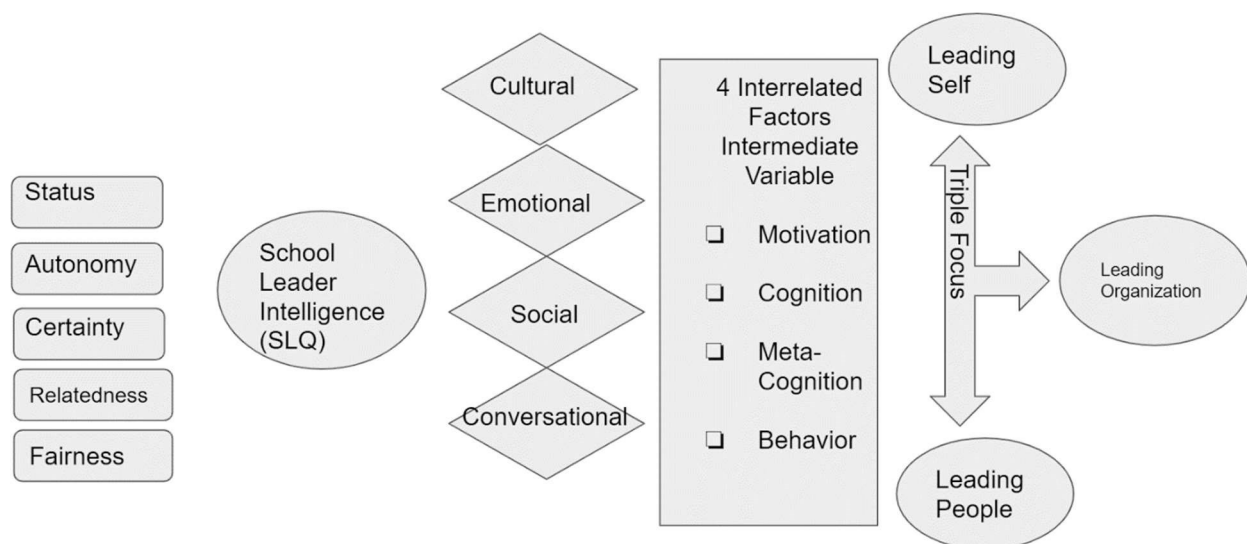


Figure 3. School leadership intelligence that affects leadership effectiveness.

Coding Procedures

The SLQ measures (social, emotional, conversational, and cultural) were coded for each study, using Rock's (2013) SCARF Model in which school leadership behavior and practice are aligned with school leaders' intelligence (social, emotional, cultural, and conversational). Rock (2013) defined SCARF as follows: S = Status, which is one's sense of importance or rank relative to others in a group; C = Certainty, which is one's clarity and adherence to the vision, goals, and objectives; A = Autonomy, which is one's control over one's workflow and destiny;

R = Rank, which is one's sense of safety and belonging in a group; and F = Fairness, which is one's perception of morality and integrity. School leadership effectiveness strands were aligned with Rock's SCARF Model for coding purposes.

Data Analysis

The following data analysis is a summary of the SLQ behaviors that were coded from the primary studies that met the inclusion and exclusion criteria. The selected primary studies were examined for leadership practices and cultural, social, and emotional behaviors that were considered the best predictors for leadership effectiveness. *The National Board Certification for Educational Leaders: Accomplished Principals Standards* (NBPTS, 2010) was coded using Rock's (2013) SCARF Model to identify the frequency of the school intelligence behaviors that were embedded in leadership standards. Table 6 identifies the number of SCARF positions and behaviors that were coded for school leadership effectiveness. Each school leadership standard from the *National Board Certification for Educational Leaders: Accomplished Principals Standards* (NBPTS, 2010) were categorized into one or more SCARF positions. The total number of standards for each SCARF domain was added and was then divided by the total number of standards to determine the highest number of SCARF behaviors aligned to the accomplished school leadership practices.

Table 6

Frequency of SCARF Behaviors That Are Aligned With School Leadership Standards

<u>SCARF behaviors</u>	<u>Number</u>	<u>Percentage</u>
Status	23	15
Certainty	41	28
Autonomy	14	9
Relatedness	33	22

Fairness	38	26
	149	

Note. See appendix for coding of school leadership standards.

The SCARF model was aligned with school leadership dimensions and competencies to establish a crosswalk with school leadership standards, behavioral competencies, and applied neuro-leadership domains for data analysis. The four neuro-leadership domains that were used in this systematic review were (a) decision making and problem solving, (b) regulation of emotion, (c) influence and collaboration, and (d) change facilitation (Rock, 2013; Donde and Williams, 2013). Each neuro-leadership domain was aligned to the SCARF positions and was analyzed using school leadership effectiveness standards and behavioral competencies. The highest SCARF position that was identified was certainty at 28%. Rock (2012) stated that humans have a need for predictability and clarity, ambiguity increases negative emotions and activates the threat circuitry of the brain. The second and third highest SCARF positions that were identified for leadership effectiveness were fairness at 26% and relatedness at 22%. Glaser (2014) explained that relatedness is linked to trust and feeling connected, which turns on the mirror neurons of emotions, increasing task motivation and generating positive emotions around creating shared goals. Therefore, when interacting on an individual basis or in a team, one's perceptual senses scan for fair exchanges between people.

The Center for American Progress (2014) conducted a case study on a school district that demonstrated a track record of narrowing the achievement gap and finding solutions to complex problems within the school system. The school district designed a school leadership competencies and dimensions framework that was aligned to school leadership standards. The school leadership competencies identified in the framework were used to develop the SCARF and SLQ Crosswalk to School Leadership Dimensions (Appendix A). The following behavioral

competencies for school leadership effectiveness that were used in this systematic study were (a) belief in children, (b) building relationships and influencing others, (c) establishing a culture of high expectations, (d) instructional leadership, integrity, stamina, initiative, and persistence, (e) strategic decision making and problem solving, and (f) talent management and development (Center for American Progress, 2014, p. 8). The SCARF positions observed in the primary studies were aligned to the four applied neuro-leadership behaviors and the *National Board Certification for Educational Leaders: Accomplished Principal Standards* (NBPTS, 2010) to generate the Thematic Coding Guide Aligned to Rock’s SCARF Model: A SCARF Crosswalk With the *National Board Certification for Educational Leaders: Accomplished Principals Standards* (Appendix B). The four applied neuroscience domains that are aligned to the SCARF Model indicated that 30% of accomplished school leaders’ behaviors fall under the change facilitation category, which was followed by regulation of emotions at 28%.

Table 7

The Number and Percentage of SCARF Behaviors That Are Aligned to the Four Domains of Applied Neuroscience and the Accomplished Principal Standards

Domains of applied neuroscience and accomplished principal standards	Number	Percentage
Decision making and problem solving	18	18
Regulation of emotions	28	28
Influence and collaboration	25	25
Change facilitation	30	30
Total	101	

Note. See Appendix B for coding of school leadership standards.

SCARF for Effective School Leadership

The accomplished school leader uses the five domains of human social experience by understanding how to activate the primary rewards circuitries of the brain while minimizing the threat circuitries of the brain. To increase the organizational effectiveness in a school setting, an accomplished school leader needs to understand how one's SCARF position in relation to others drives individual performance, engagement, motivation, and well-being. Using the findings from the 11 primary studies that were analyzed for this systematic review, effective school leaders were found to have skills and behavioral competencies that drive and develop the cognitive resources of individuals including talent management, setting high expectations, instilling self-initiative, influencing positive relationships, and demonstrating integrity. The SCARF alignment to accomplished principal standards is shown in Figure 4. Rock (2013) noted that leaders need to understand emotional contagions which can elicit positive (reward) or negative (threat) SCARF emotions in individuals, which can have a direct impact on cognitive resources and productivity.

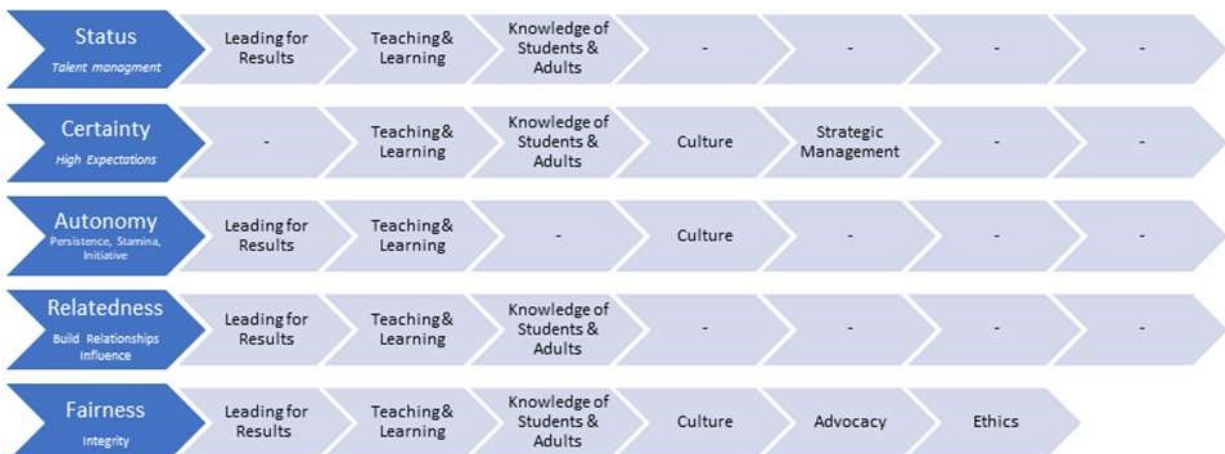


Figure 4. SCARF behaviors that are aligned to accomplished principal standards.

Figure 4 shows how the SCARF Model is integrated with the National Board Certification for Educational Leaders: Accomplished Principal Standards (NBPTS, 2010) and school leadership behavioral competencies (dimensions) for effective leadership, using school leadership intelligence. Each chevron is separated out and is discussed so that the reader can

understand the way that effective school leaders apply neuro-leadership in their daily practice for effective change.

S-Status for Effective School Leadership: Talent Management

The S-Status in the SCARF model is focused on developing and building the capacities of all individuals within the school organization, using talent management skills. Effective school leaders who use SLQ can build the capacity of individuals within the school community by knowing the adults whom they serve in the school environment. Knowledge and understanding of how one's social position in relation to others affects their threat or reward brain circuitry requires core competencies in knowing how to lead to accomplish results, to monitor teaching and learning, and to build the capacities of both students and adults (see Figure 5).



Figure 5. SCARF status behavior that is aligned to accomplished principal standards.

An accomplished school leader can increase the status of everyone by strategically providing opportunities for professional growth. The primary research findings for the four applied neuro-leadership domains that are aligned to status in the SCARF Model are shown in Figure 8. Key findings in the primary studies about status indicated that school leaders could increase the status of individuals through self-awareness and social awareness.

A leader with a core competency in talent management can use problem-solving and decision-making skills to design teacher leadership opportunities and career pathways that are personally rewarding, meaningful, and challenging to everyone in the school organization. When individuals (a) are given the opportunity to participate on committees and to take on leadership positions, and (b) are asked to use their expertise, and (c) are empowered to solve complex issues, and (d) are appreciated for their unique gifts and talents, (e) workplace engagement and

motivation increase. Meyerson (2012) noted that effective principals have internal motivation to understand each individual and the skills to help everyone understand other people. Therefore, when assessing the levels of commitment and engagement in the school environment, effective school leaders understand how to use conversational intelligence and SLQ to support and encourage others to grow and develop.

School leaders who understand the reward threat mechanism of the brain recognize that status is equivalent to one's survival. One should be aware of increasing status threats when giving instructional feedback, for insinuating that an individual might be slightly ineffective could lead to employee disengagement. Therefore, the effective school leader has the skills to assess the levels of employee engagement using the personal and emotional connection that drives his or her work effort. Nevertheless, the evaluation could trigger a threat response. Martin-Kniep (2013) stated,

there is a positive relationship between our status and our dopamine receptors. With ever increasing external accountability requirements, such status is threatened if the school is not meeting standards but can be enhanced when administrators are able to redirect their attention to the way in which they inspire or influence the people they are responsible for.
(p. 513)

Accomplished school leaders who use SLQ can use conversational intelligence (Glaser, 2014) to increase the status of individuals by engaging in reflective coaching conversations, positive peer feedback, and acknowledgement of individuals' areas of knowledge, skills, and expertise.

Table 8

The Four Domains of Applied Neuroscience and School Leadership Intelligence That Are Aligned to S-Status in the SCARF Model

Domains of applied neuroscience and school leadership intelligence	SCARF behavior of S-Status
Decision making and problem solving	Differentiation of professional development to build professional capacity (Brazil & Scott, 2003; Ledford, 2008; Mason, 2018; Saxe, 2011).
Regulation of emotions	Facilitates the growth and cohesiveness of self and other individuals (Wendorf-Heldt, 2009).
Influence and collaboration	Intellectual development and stimulation of self and others through peer support (Saxe, 2011).
Change facilitation	Systematic peer observations for culturally responsive pedagogy and interactions (Meyerson, 2012).

C-Certainty for Effective School Leadership: High Expectations

The C-Certainty in the SCARF model is about clarity and predictability with a focus on high expectations for teaching and learning, the development of adults and students, and the commitment to building a strong culture. When individuals know what will happen next during the change process, they will be able to respond and adapt to organizational change.

Predictability in a school environment leads to planning for powerful instruction, team collaboration, monitoring, evaluating, and modifying to achieve academic results. Accomplished school leaders establish cultures of high expectations using the four domains of applied neuro-leadership (see Figure 6).



Figure 6. SCARF certainty behavior that is aligned to accomplished principal standards.

Effective school leaders have a high level of transparency and lead with certainty regarding the vision, mission, and structures for achieving results. Mason (2018) conducted research on the emotionally intelligent leader and noted that moving teachers from isolation to collaboration, changing the focus from teaching to student learning, implementing structures and processes that systematically monitor student learning and increase accountability, and distributing leadership is a huge paradigm shift for most American schools. It will be a daunting task and will take an emotional toll on teachers, students and principals. For school leaders to think they can make such a cultural shift without resistance, conflict and emotions, is to say that the leaders have not been well educated in the research of leading change (p. 17).

Rock and Ringleb (2013) studied neuro-leadership and discovered that humans have a need for predictability and clarity. When uncertainty exists, the threat circuitry of the brain is activated, sending an error response message to the orbital frontal cortex in the brain eliciting uncertainty, feelings of not knowing what to do, and increased stress for unmet or job performance expectations. Therefore, uncertainty can decrease the reward brain circuitry and increase the threat neural circuitry by activating the amygdala and creating high levels of anxiety and stress. The applied neuro-leadership domains that are aligned to certainty in the SCARF Model are shown in Table 9. Key findings in the primary studies about certainty indicated school leaders can increase predictability and minimize ambiguity by openly communicating, coaching, motivating and engaging in reflective conversation using conversational intelligence about clear expectations for performance and desirable outcomes for professional growth. The effective

school leader understands how to use SLQ to increase the dopamine levels in the brain to generate rewarding feelings of predictability.

Table 9

The four Domains of Applied Neuroscience and School Leadership Intelligence That Are Aligned to C-Certainty in the SCARF Model

Domains of applied neuroscience and school leadership intelligence	SCARF behavior of C-Certainty
Decision making and problem solving	Employ different strategies and tactics, depends on situation and subordinate’s level of resistance to change, use emotional persuasion, evidence and reasoning (Mason, 2018).
Regulation of emotions	Inspiration and motivation to guiding the work of both individuals and teams (Saxe, 2011).
Influence and collaboration	Teamwork involving the pursuit of shared goals by using group synergy (Saxe, 2011).
Change facilitation	Models passion; Believes in shared leadership, Strong communication skills; Strong sense for advocacy, belief system that educators make a difference (Wendorf-Heldt, 2009).

A-Autonomy for Effective School Leadership: Initiative



Figure 7. SCARF autonomy behavior that is aligned to accomplished principal standards.

The A for Autonomy in the SCARF model focuses on allowing individuals to develop their own workflow systems to take control and responsibility for their success in the workplace environment. Accomplished school leaders recognize the complexities of change and use their leadership platform to facilitate the change process using coaching strategies, to help individuals

visualize their sense of control and power in the workplace. When common language is used to discuss teaching and learning, it helps individuals engage in reflective practice to set goals and targets that will drive and motivate the individual's day to day actions for achieving results.

School leadership effectiveness requires leaders to model autonomy through persistence, stamina, and initiative (Center for American Progress, 2014). Intrapersonal competence accesses multiple pathways in the brain including the executive functions of the frontal lobe, the affective, heart-gut feelings of the limbic system, and the sensory mechanisms from the parietal lobe. When these brain pathways integrate, it can influence the levels of engagement for self-management, self-regulation, self-awareness, and internal motivation for, drive, commitment, and achievement towards organizational goals (Rock, 2013; Sprenger, 2012). McDonald (2013) defined self-awareness as trusting one's motives, feelings, and desires brought about through introspection and personal insight. Personal insight leads to an awareness of one's strengths and weaknesses and activates areas of the brain associated with self-regulation and behavioral change to access the reward circuitry of the brain (Rock, 2013). Saxe (2011) conducted research on the emotional and social competency of school leadership and noted that the change process for school improvement has a high emotional cost. The effective school leader understands how to regulate emotional triggers and words such as resistance, frustration, stress, anger, and turmoil by minimizing disengagement threat reactions within the organization. Therefore, applied neuro-leadership skills and SLQ are requisite skills for change facilitation (Saxe, 2011).

When individuals feel that they have control over the decisions and choices in their work environment, there is a decrease in the release of the cortisol stress hormone. School leaders who establish healthy cultures by using SLQ to create self-driven workflow systems to increase the status, certainty, and relatedness of everyone will also increase the reward circuitry of the brain for self-management and self-directed learning. The primary research findings for the four

applied neuro-leadership domains that are aligned to autonomy in the SCARF Model are shown in Table 10. The authors of the key findings in the primary studies about autonomy indicated that school leaders could increase their perception and sensation of having control and choice over their work environment by allowing individuals to engage in reflective practice and to set their own goals that would be aligned to the criteria or desired outcome of assigned tasks. Quy (2019), who studied individuals' willingness versus willpower, explained, "You need to balance your willingness to work alongside your willpower because willpower is your ability to get things done" (p. 1). Therefore, if a person relates his or her performance to something that is personally valuable or meaningful to him or her, he or she will be intrinsically motivated to be a "go-getter" because he or she will desire the intrinsic reward circuitry of the brain that comes with reflecting, adapting and working hard. Rock and Cox (2013) noted, "Anticipation of making a choice increases activity in the reward regions, specifically the ventral striatum, supporting the idea that a sense of autonomy is rewarding" (p. 337). Autonomy works well for individuals who are self-directed and have self-management skills, willingness, willpower, and internal motivation. When individuals are inspired and motivated to work, employee engagement increases because the internal behavior is intrinsically self-generated. Whereas, individuals who are motivated by extrinsic factors have a reduction in their intrinsic motivation circuitry, which will then require effective coaching strategies to support the development of autonomy.

Table 10

The Four Domains of Applied Neuroscience and School Leadership Intelligence That Are Aligned to A-Autonomy in the SCARF Model

Domains of applied neuroscience
and school leadership intelligence

SCARF behavior of A-Autonomy

Decision making and problem solving	Leads and decides through self-management having a strong work ethic and wanting to be a strong person (Khalifa, 2010; Ledford, 2008; Mason 2018; Wendorf-Heldt, 2009).
Regulation of emotions	Aware of self-presence and impact of self on others by encouraging others to state opinions (Khalifa, 2010; Saxe, 2011; Mason, 2018).
Influence and collaboration	Self-reflects on effectiveness using community voice data (Meyerson, 2012).
Change facilitation	Accepts change by demonstrating resiliency and flexibility. Welcomes encourages risk taking, makes school environment safe to learn from mistakes (Saxe, 2011; Wendorf-Heldt, 2009).

R-Relatedness for Effective School Leadership: Relationships



Figure 8. SCARF relatedness behavior that is aligned to accomplished principal standards.

The R-Relatedness in the SCARF Model is focused on building strong relationships in a psychologically safe work environment. The accomplished school leader uses relational transparency to create relationships that provide ongoing positive emotional support and professional growth. Establishing the structures for teamwork and collaboration increases the sense of connection that individuals have with one another and helps to influence the decision-making process to commit to organizational goals.

School leaders that have the competency to influence and build strong relationships know how to connect, collaborate, and contribute to building a sense of value and safety with other individuals. The accomplished school leader knows how to drive to relationships for results and the success of the organization. Mason (2018) noted that interpersonal relationships were an important factor in school leadership effectiveness. Social awareness in the organization can help mitigate the stress levels when school leaders understand the role of relationship management during the change process. Relationship management requires a high level of relational transparency about one's motives, intentions, thoughts, and feelings. Essentially the school leader leads with a no secret agenda, operating from a platform of trusting the knowledge, skills, expertise of each individual and differentiating professional growth through collaborative genuineness and transparency to meet organizational goals (McDonald, 2013). When school leaders interact effectively with each adult and student who comes from a diverse background and culture, the appreciation level for feeling a sense of belonging within a school organization increases. Everyone's SCARF position begins moving towards a sense of purpose and action in the learning community. The primary research findings for the four applied neuro-leadership domains that are aligned to relatedness in the SCARF Model are shown in Table 11.

The key findings in the primary studies about relatedness indicated that school leaders could increase their relationship management skills (a) by being open and transparent, (b) by limiting the mixed signals (consciously or unconsciously through body language) that they send, and (c) by using conversational and SLQ (McDonald, 2013). Awareness of in or out social groups or tribes that form where individuals feel a sense of belonging increases a school leaders' effectiveness by strategically and authentically creating ways to increase task motivation, using socially shared goals (Rock, 2013). The neural networks for empathy and supporting healthy interactions are activated when individuals use their mirror neurons to share another person's

feeling or experience or when trying to understand another's perspective. The dorsal medial prefrontal cortex, the temporoparietal junction, and the posterior cingulate cortex of the brain are responsible for processing social inferential perspectives and empathy. The interpersonal competency of relatedness requires social awareness and social skills to relate to others from diverse cultural background using cognitive, behavioral, and meta-cognitive awareness to understand others. Effective school leaders accomplish relatedness through relationship building empathy, communication, and collaboration for effective change. When school leaders ensure a sense of belonging among teachers who work together, people feel a higher level of trust and empathy for the individuals with whom they work closely. The feeling of being accepted can open lines of communication among peers in a safe workplace environment that welcomes peer feedback, using clearly established predictable common language for continuous monitoring and evaluating organizational effectiveness.

Table 11

The Four Domains of Applied Neuroscience and School Leadership Intelligence That Are Aligned to R-Relatedness in the SCARF Model

Domains of applied neuroscience and school leadership intelligence	SCARF behavior of R-Relatedness
Decision making and problem solving	Empathizing with subordinates using data to know how teachers feel about policies and effectiveness (Mason, 2018; Wendorf-Heldt, 2009).
Regulation of emotions	Positive relationship building: Connects emotional intelligence and leadership effectiveness through work interactions, work experience and empathy, and visibility (Mason, 2018, Wendorf-Heldt 2009).
Influence and collaboration	Management of relationships: Promotes teamwork and collaboration by managing conflict, using data, and modeling leadership (Mason, 2018; Wendorf-Heldt, 2009).
Change facilitation	Develop positive cultural community relationships (Meyerson, 2012).

F-Fairness for Effective School Leadership: Integrity



Figure 9. SCARF fairness behavior that is aligned to accomplished principal standards.

The F-Fairness in the SCARF Model is focused on fairness and ethical behavior of an effective school leader. School leaders who display the traits of honesty, integrity, impartiality, equity, and morality lead with school leadership intelligence. The processes underlying individuals' thought patterns, perceptions, and emotional regulation are the result of fairness. Effective school leaders understand the integrity competency is an outward appearance of one's actions that are aligned to their internal beliefs systems. To engage individuals with accepting a

new initiative, they complete an internal self-assessment to determine whether they respect or trust the leader who is proposing the change. The primary research findings for the four applied neuro-leadership domains that are aligned to fairness in the SCARF Model are shown in Table 12. The authors of the key findings in the primary studies about fairness indicated that accomplished school leaders' model, promote, and exhibit an ethical moral behavior displaying fairness, honesty, respect, and integrity. Social interactions require openness, transparency, and trust. The neuropeptide oxytocin is a chemical that is released in the brain when the feeling of trust is present. If an individual feel that unfair exchanges or unethical practices are occurring in the workplace environment, his or her capacity to trust will decrease, and the threat circuitry of the brain will be activated (Rock, 2013).

Table 12

The Four Domains of Applied Neuroscience and School Leadership Intelligence That Are Aligned to F-Fairness in the SCARF Model

Domains of applied neuroscience and school leadership intelligence	SCARF behavior of F-Fairness
Decision making and problem solving	Analyze student voice cultural data (Meyerson, 2012).
Regulation of emotions	Seeks hiring someone genuine, honest with integrity, competent, communicates well, and others can trust to do right (Wendorf-Heldt 2009).
Influence and collaboration	Uses individual social and cultural backgrounds and expertise (Khalifa, 2010; Meyerson, 2012).
Change facilitation	Promotes fairness, equity, social justice (Meyerson, 2012).

In Chapter 5, the discussion of findings will uncover and analyze the neuroscience behind the way that school leaders can create productive school environments by understanding their level of SLQ as aligned to applied neuroscience to develop effective neuro-educational leadership practices. Using thematic coding methods, the researcher attempted to synthesize the scope and composition of literature on SLQ (social, emotional, cultural) and school leadership effectiveness as they are aligned to the domains of applied neuroscience so that the researcher could answer the questions:

1. What does it mean for a school leader to lead his or her school environment intelligently, using effective leadership practices?
2. Why do school leaders need to lead their school organization with school leadership intelligence?

The purpose of this narrative synthesis was (a) to study the relationship between effective school leadership practices and SLQ comprised of one or more of the forms of intelligence—social, emotional, cultural, and conversational intelligences—which will be collectively defined as SLQ, and (b) to define the field of neuro-educational leadership for aspiring and existing school leaders. a new educational leadership model and educational leadership programs must be developed to train school leaders to increase their influence for change and organizational intelligence through the application of applied neuroscience. This can be accomplished by shifting leadership practices from a static state of leading to a dynamic method of leading.

CHAPTER 5

DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

School leaders with high emotional, social, cultural, and conversational intelligence can lead themselves, others, and an organization to achieve institutional goals. As the fields of neuroscience, education, and leadership continue to merge, the 21st century leader needs an understanding of the basic architecture of the brain, human mindsets, and behavior for organizational effectiveness. The purpose of this research was to lay the groundwork for using the field of neuro-educational leadership to help instructional leaders understand the neural basis for employee engagement, motivation, and productivity, using SLQ and SCARF positions that affect human interactions. A skillful school leader can connect people across an organization by (a) building and tapping into the expertise and talents of each individual, (b) building trusting relationships, and (c) synchronizing the mission and vision into clear actionable steps to provide clarity and certainty for autonomy and collaboration. One might wonder, why is it important to understand both the logical–analytical and the emotional–instinctual sides of the brain? It is important because every individual within an organization has his or her own reality of fairness and success according to his or her unique SCARF position. Therefore, an effective leader can recognize and use emotional regulation to influence team collaboration, facilitate change, make decisions, and solve problems using SLQ.

The impact of SLQ on a school leader’s effectiveness was analyzed, using four domains of applied neuroscience (decision making and problem solving, regulation of emotions, change facilitation, and influence and collaboration) and Rock’s SCARF Model for status, certainty, autonomy, relatedness, and fairness. A total of 239 primary studies were identified for analyses.

Each primary study identified was organized into one of the following SLQs: cultural intelligence (33 primary studies), social intelligence (86 primary studies), and emotional intelligence (120 primary studies). These identified studies were saved in Google Scholar and were analyzed further using the following keyword searches: neuroscience (47 primary studies), leadership development (13 primary studies), effect size (10 primary studies), “effect size, Pearson correlation intelligence” (6 primary studies), neuro-leadership (10 primary studies), cultural competencies (10 primary studies), social–emotional competencies (7 primary studies), and communication (19 primary studies). The inclusion criteria were applied to the primary studies that were identified; 11 of the studies were identified for analysis using the vote-count method that is described in Chapter 3 and shown in Table 13.

Table 13

Database and Journal Vote Count and Coding of Content Theme Analysis of Intelligences and Neuroscience Underpinnings

Author, year	Leadership model or approach	Vote count evidence*	Content theme analysis
Saxe, 2011	Transformational/MLQ	2 Dissertation	Social Emotional
Collins, 2015	Transformational/CQS	3 Journal	Cultural
Wendorf-Heldt, 2009	Transformational/EIQ	3 Dissertation	Emotional
Khalifa, 2016	Transformational/CRSL	1 Journal	Cultural
Mason, 2018	Transformational/WELS	2 Dissertation	Emotional
Dhaliwal, 2010	Transformational/MLQ	3 Dissertation	Cultural
May-Vollmar, 2017	Transformational/CQS	3 Dissertation	Emotional

Ledford, 2015	Transformational/ESCI	1 Dissertation	Social
Meyerson, 2012	Transformational/CQS	2 Dissertation	Cultural
Keung & Rockinson-	Transformational/CQS	3 Journal	Cultural
Szapkiw, 2012			

Note. * Strong = 3, Moderate = 2, Insufficient = 1; CRSI = Culturally Responsive School Leadership, CQS = _____, EIQ = Emotional Intelligence Questionnaire, ESCL= Emotional and Social Competence Inventory, MLQ = Multifactor Leadership Questionnaire, WELS = Widener Emotional Learning Scale.

Analysis Key

- High Quality score point – 1: Quantitative analysis, clear focus of study, background provided, planned method, validated measures, participant adequate for study population, data analysis, and statistical methods clearly outlined effect size present.
- Medium Quality score point – 2: Study focus limited, background provided is limited, methodology vague, limited measures, limited number of participants, and limited data analysis.

An assessment of primary research quality was conducted, using a data extraction form (see Table 4). From the analysis of the 11 primary studies in this systematic review, one transformational leadership rating scale (the Multifactor Leadership Questionnaire [MLQ]) was used to analyze two studies to measure leadership effectiveness, and one of the following scales was used to analyze the effectiveness of the remaining studies against school leadership: (a) Cultural Intelligence Scale, (b) the Mayer–Salovey–Caruso Emotional Intelligence Test, (c) the Emotional Intelligence Questionnaire, (d) the Culturally Responsive School Leadership, (e) the Widener Emotional Learning Scale, and (f) the Emotional and Social Competence Inventory.

The 11 primary studies were comprised of quantitative (50%), qualitative (25%), and mixed method (25%) measurements. Approximately 80.35% of the primary studies analyzed were dissertations and 19.65% journal publications. Of the 11 studies analyzed, five authors

examined cultural intelligence and leadership effectiveness, one author examined social–emotional intelligence, one author examined social intelligence, and four authors examined emotional intelligence and leadership effectiveness. Each study was analyzed, using coding themes from the SCARF and SLQ Crosswalk to School Leadership Dimensions. A narrative synthesis was developed on the 11 primary studies, using the vote-count method described in Table 13.

Discussion of Findings

The neuroscience of relating and collaborating with individuals requires that the SLQs of social, emotional, and cultural forms of intelligences can be seamlessly interconnected with conversational intelligence (Glasser, 2014; Crown, 2009). Social processing, interacting, and reasoning begin in the brain. Regarding the neuroscience of engagement aligned to Rock’s (2013) SCARF model, Rock and Martin-Kniep (2013) identified that “there is a positive relationship between our status and our dopamine receptors” (p. 507). Rock and Martin-Kniep explained that status is equivalent to survival and could generate either a reward response or threat response in individuals within a small or a large group setting. Rock and Cox (2013) proposed a conceptual model of how SCARF positions elicit adaptive behaviors in individuals depending on the mentalizing state and experiences in a workplace environment over time. Therefore, status is significant to individual productivity because, according to brain researchers, social pain is equivalent to physical pain and is processed in the same area of the brain.

Findings on School Leadership Models aligned with School Leadership Intelligence

SLQ requires the reflective skill and practice of looking inward. This is a process known as interpersonal attunement, which is a key characteristic of transformational leadership. Table 13 identifies the leadership models and approaches aligned with social, emotional and cultural intelligence. The four domains of neuro-leadership targets all transformational leadership

competences ranging from visionary, communication, empathy, problem solving, decision making, influencing others, social and emotional intelligence. Meyerson (2012) researched the impact of cultural intelligence on leadership effectiveness and found that exceptionally effective school leaders used cultural intelligence daily when interacting with the staff, students, and school community. Meyerson noted, “Evidence also indicates that the effective principals are aware of these levels of cultural intelligence and use this awareness to improve their interactions with individuals from diverse cultures” (p. 9). With the ability to reduce brain circuitry threats to relatedness, the effective school leader naturally feels comfortable collaborating with people from different cultural backgrounds. The school intelligent leader also knows how to build the capacity of other individuals’ cultural intelligence by creating social time and events for people to interact with people from different backgrounds. Fullan (2010) stated, “Thus, the role of the leader is to enable, facilitate, and cause peers to interact in a focused manner. Peer interaction is the social glue of focus and cohesion” (p. 36). The social glue within a school will make a difference between success and failure in creating psychologically safe environments for students and teachers to close the achievement gap and lead for results.

Kline (2011) conducted an analysis of underperforming schools and found that teachers consistently scored their school leaders low on the social and emotional SELF survey as compared to teachers who worked in higher performing schools. As a result, the teachers believed that the social and emotional skills of a principal have an effect on leadership effectiveness. Meyerson (2012) concluded,

The development of more culturally and emotionally intelligence school leaders will help create a new generation of leaders who can understand people’s emotions and cultural backgrounds while leading effectively. Creating the conditions to support the need for more culturally intelligent and effective principal leaders will require a strong conviction

in the moral righteousness of addressing the problem of achievement gap between white students and students of color. It will require a conviction that becomes more complicated because of the diverse beliefs, needs, interest, and values of all stakeholders. (p. 145)

SLQ requires an understanding of workplace behavior and an awareness of what others are feeling. An effective school leader has the competency to build relationships and influence others by managing the impressions of others by being fair and equitable through the training and development of one's control over their brain circuitry. Therefore, school leadership development requires deep reflective practice to understand oneself and to have the social awareness to manage the impact of negative feelings in the workplace environment

Fullan (2010) summed up the skills that make a school leader, stating,

You can break trust down into several dimensions, but to me there are just two to remember and model-integrity (sincerity, reliability, honesty) and competence (skill, effectiveness). Both are important. You don't want to rely on a leader who is 100% sincere but not very competent at what he or she needs to do to lead. (p. 66)

As Meyerson (2012) noted, with the ability of school leaders to use their SLQ lens to develop others, "they become leaders committed to educating all students to high levels through knowing, valuing, and using the students' cultural backgrounds, languages, and learning styles within the selected curricular and instructional contexts" (p. 112). Both integrity (fairness) and competence (certainty) are necessary for school transformation. When school leaders have inviting behaviors and positive interactions with their staff, they exhibit strong relatedness skills. According to Meyerson (2012), school leaders who are proficient in relatedness have the ability to influence and collaborate with others to facilitate change. As a result, team collaboration is strengthened, and the internal motivation to engage, commit, and adapt during the change

process is increased. Dhaliwal (2010) examined the leadership effectiveness and cultural intelligence of educational managers and found a direct correlation between the transformational leadership and cultural intelligence. Collins (2015) researched cultural intelligence and principal effectiveness on Latino student achievement and found that school principals with high cultural intelligence have adaptive skills by which they can tap into motivational cultural intelligence (to be interested in self and others) by using their cognitive cultural intelligence (to know their values, beliefs, and practices), metacognitive cultural intelligence (to influence and collaborate) and their behavioral cultural intelligence (to regulate their emotions authentically) by interacting confidently in diverse environments and cross-cultural settings. Therefore, effective school leaders with higher levels of cultural intelligence exhibit transformational leadership behavior because of their ability to have higher levels of cooperative behavior management, decision making, innovation, and workplace engagement and performance.

The cultural intelligence scale that Keung and Rockinson-Szapkiw (2012) and Collins (2015) used was focused on the behavioral, motivational, and metacognitive and cognitive constructs of intelligence.

Keung and Rockinson-Szapkiw (2012) examined the relationship of cultural intelligence and transformational leadership by comparing measures from the Cultural Intelligence Scale and MLQ. The five factors of transformational leadership were analyzed using the MLQ scale to determine which factors of cultural intelligence predicted leadership effectiveness. The MLQ scale measured attributed and behavioral idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration. Keung and Rockinson-Szapkiw (2012) stated, "Idealized influence (attributed) reflects the degree to which followers view the leader as confident, powerful, and focused on higher order ideals and ethics" (Fairness). Idealized influence (behavior) refers to the "charismatic actions of the leader that are centered on values,

beliefs, and a sense of mission” (Certainty). Inspirational motivation is “the ways leaders inspire followers by envisioning an optimistic culture, setting ambitious goals, and offering encouragement that the vision is achievable” (Relatedness). Behavioral and cognitive cultural intelligence related to team effectiveness and innovation, while cognitive cultural intelligence was positively related to cultural decision making and judgement. Keung and Rockinson-Szapkiw (2012) suggested a need to integrate cultural intelligence into graduate level education courses, school leadership training, and professional development programs.

The ways that leaders challenge followers to think creatively, reframe difficult problems to find solutions, and encourage innovation know as intellectual stimulation (Autonomy). Individualized consideration is the ways in which leaders advise, support and focus on individual needs of followers to encourage their growth and development (Status)” (p. 3). Fullan (2010) noted that leaders “don’t find completely complex. People do expect their leaders to help them find the way, to find hope no matter what. By taking the mystery out of complexity, they reassure people that progress is probable” (p. 76). Effective school leaders know how to create school environments with clear systems that use common language for teaching and learning and leading for results to provide predictability (certainty) and internal motivation (autonomy) where one can use one’s cognitive power to problem solve, make decisions, and create solutions to complex issues.

School Leadership Intelligence for Decision Making and Problem Solving

School leadership in the 21st century requires instructional leaders to engage in cross cultural interactions that require social, emotional, cultural, and conversational intelligence. As school leaders engage in decision-making processes to solve problems, they also simultaneously must regulate emotions, collaborate with others, facilitate change to inspire, and motivate and engage individuals to commit to the vision and mission of the organization for high levels of

student achievement and high-quality instructional practice. Crowne (2009) conducted the first research on the interconnectedness of social, emotional, and cultural intelligence and found evidence to support its impact on leadership behavior. Crowne (2009) said that one of the barriers to studying intelligences is the lack of interconnectedness. Crowne stated, “When researching social intelligence, emotional intelligence, and cultural intelligence, one may find some references to others, but there is no integrated model that exists and that incorporates all three constructs, it is important to evaluate how they are related” (p. 148). Crowne went on to say, “Organizations who are interested in training SI, EI and/or CQ [social intelligence, emotional intelligence, and cultural intelligence] should consider training programs that incorporate all these intelligences, since there are aspects of each that are related” (p. 118). Table 14 outlines the summary of the primary research findings for decision making and problem solving that are aligned to Rock’s (2013) SCARF position.

Table 14

SCARF Behaviors That Are Aligned to the Applied Neuroscience Competencies of Decision Making and Problem Solving

SCARF behaviors	Applied neuroscience competencies for decision making and problem solving
S-Status	Differentiation of professional development to build professional capacity (Brazil & Scott, 2003; Ledford, 2008; Mason, 2018; Saxe, 2011).
C-Certainty	Employ different strategies & tactics, depends on situation and subordinate’s level of resistance to change, use emotional persuasion, evidence and reasoning (Mason, 2018).
A-Autonomy	Leads and decides through self-management having a strong work ethic and wanting to be a strong person (Keung & Rockinson-Szapkiw, 2012; Khalifa, 2010; Ledford, 2008; Mason, 2018; Wendorf-Heldt, 2009)).

R-Relatedness	Empathizing with subordinates using data to know how teachers feel about policies and effectiveness (Saxe, 2011; Mason, 2018; Wendorf-Heldt, 2009).
F-Fairness	Analyze student voice cultural data (Meyerson, 2012).

May-Vollmar (2017) conducted research on emotional intelligence and school leader effectiveness and found that emotional intelligence is a strong predictor for implementing leadership practices effectively. In addition to school leaders having an ability to regulate their emotions, they need to understand the role that their emotions play when it comes to change facilitation. May-Vollmar (2017) stated, leaders who exercise self-awareness and self-control, for example, will be able to detect when an interaction is causing them to feel frustrated and will be able to control their emotional response during the interaction. For example, a leader may be well trained in the leadership practice inspire a shared vision, yet frustration on the leader's part can get in the way of the leader effectively implementing the leadership practice. (p. 106)

The leader's ability to understand and recognize the emotional triggers by becoming self-aware of their own emotions and the emotions of how other individuals feel make them better able to increase the motivational and engagement levels by strategically thinking about how to minimize stress and elicitation of negative emotions in the workplace.

Saxe (2011) conducted research on the emotional and social intelligence of school leaders and found that effective leaders build strong relationships (a) by relating to others and being fair, (b) by providing autonomy and certainty during the change process, (c) by increasing the status of individuals through individual support and collaboration. Saxe (2011) shared the following findings from his research.

Building relationships is a strength for Leader 4. Her ability to build bonds lays the foundation for her work. Leader 4 uses teamwork and collaboration to address anticipated changes with staff members. Including staff in the decision-making process encourages buy-in. Leader 4 also employs empathy in thinking about how changes might impact staff. She identifies ways to not overburden her staff. In instances that she feels changes would not positively impact her staff she serves as voice for them, advocating for needs of her campus. (p. 129)

Saxe (2011) concluded that organizational success is dependent on leadership effectiveness for creating opportunities for collaboration and autonomous reflective and systems thinking engagement that embraces self-regulation for social justice, distributed leadership, and commitment to the change process. Furthermore, Saxe (2011) found a positive relationship between self-management (autonomy) and behavioral idealized influence (relatedness) from the MLQ transformational leadership scale, indicating leaders with behavioral competency for influence encourage reflection, adaptability, and flexibility during the change process for quick adjustments to setbacks and commitment to improve performance.

Sprengr (2010) explained that leaders in the 21st century must have more than merely cognitive skills for decision making and problem solving, they must have intelligent competencies to understand themselves and others. Springer explained,

Leaders are under an enormous amount of pressure. Pressure causes the brain to operate at a lower, more instinctive and reflexive level. Old habits and patterns begin to appear, and the stress and frustration spread throughout the organization. You may begin to micromanage to get control. (p. 67)

Wendorf-Heldt (2009) concluded, “Emotionally intelligent school leaders are intentional in embedding emotionally intelligent leadership practice in their work as school leaders. They

are reflective, aware, and adjust their practice in ways that further organizational goals” (p. 160). Rock (2013) reiterated the importance of autonomy in a workplace by explaining that individuals have a need for having control over their choices in an environment. Rock (2013) stated, “Inescapable or uncontrollable stress can be highly destructive, whereas the same stress interpreted as escapable is significantly less destructive” (p. 318). In the *National Board Certification for Educational Leaders: Accomplished Principals Standards*, the NBPTS (2010) emphasized the need for school leaders to engage in self-reflection and self-renewal by developing the capacity of all individuals to think creatively outside of the box by building a strong culture of reflection.

Social–Emotional Intelligence for Regulating Emotions

Rock and Cox (2013) revealed that individuals have both a conscious and unconscious awareness of their status in relation to others, and when individuals compare themselves to other individuals with a higher status, the reptilian brain and limbic brain are activated eliciting a threat response. Glaser (2014) explained in the five-brain model that the anatomic components of the limbic system are responsible for regulation of motivated behaviors, and are comprised of the amygdala, hippocampus, fornix, cingulate cortex, septum, mammillary bodies, and striatum. Rock and Cox (2013) explained that, when an individual compares his or her status to another person with a higher status, the cingulate cortex (dorsal anterior cingulate cortex) is activated in the same brain region where pain is processed. In addition, the reward brain circuitry in the striatum is activated when status increases, and pleasure is derived during social processing. Therefore, according to Rock and Cox (2013), “status-confirming information can elicit activation in the reward neural circuitry. Activity in the striatum [is activated] when a person receives...a social reward, namely, when perceiving that he or she was acquiring a good

reputation with others” (p. 333). When individuals have a sense of importance to their colleagues and school leaders, their status increases because the reward brain circuitry has been activated.

Effective school leaders can minimize the threat circuitry of the brain and increase the reward circuitry of the brain by looking for opportunities to increase the status of individuals who work in a school environment. Opportunities to increase the status of others in a school setting include (a) open invitations to serve on committees, (b) encouragement to develop supervisory skills, (c) solicitation of other talents and expertise, and (d) personalizing professional development for continuous growth. If 21st century school leaders want to create healthy balanced school cultures, it requires expertise in teaching and learning, strategic management, and social, emotional, and cultural knowledge of both students and adults. Therefore, to facilitate change and to influence individual behaviors and collaboration, school leaders must know how to nurture and develop everyone’s capacity, using school leader intelligence to increase clarity and encourage autonomy aligned to organizational success. Rock (2013) stated, “Leadership effectiveness depend on a leader’s ability to solve complex social problem, such as the coordination of thoughts and behaviors within social groups” (p. 381). A summary of research findings from primary studies on emotion regulation is shown in Table 15.

Table 15

SCARF Behaviors That Are Aligned to the Applied Neuroscience Competency of Regulation of Emotion

SCARF behavior	Applied neuroscience competency of regulation of emotion
S-Status	Facilitates the growth and cohesiveness of self and other individuals (Wendorf-Heldt, 2009).
C-Certainty	Inspiration and motivation to guiding the work of both individuals and teams (Saxe, 2011).

A-Autonomy	Aware of self-presence and impact of self on others by encouraging others to state opinions (Khalifa, 2010; Saxe, 2011; Mason, 2018).
R-Relatedness	Positive relationship building – Connects EI and leadership effectiveness through work interactions; work experience and empathy; visibility (Mason, 2018, Wendorf-Heldt 2009).
F-Fairness	Seeks hiring someone genuine, honest with integrity, competent, communicates well, and others can trust to do right (Wendorf-Heldt 2009).

Strategic reasoning is an analytical cognitive process that disregards the affective and social neural brain networks. The cognitive neural processing involved in analytical thinking uses the prefrontal cortex found in the frontal lobes of the brain. The prefrontal cortex houses the executive functions that are necessary for strategic reasoning, decision making and problem solving. Gilkey et al. (2013) explained that individuals who are proficient in strategic thinking have a decreased activation in their prefrontal cortex and an increased activation in the limbic areas of the brain, specifically the insula and superior temporal sulcus. However, individuals who are less proficient in strategic thinking have an increased activation in the executive areas of their prefrontal cortex. These findings suggest that the more proficient strategic thinker could access the social and emotional brain circuitry for sensing–intuitive processing that allows for deep reflection or a deeper dive to access higher order thinking for insight and performance. Gilkey et al. explained,

The very presence of emotion as a motivational force has profound implications for strategic planning and implementation. Daniel Goleman’s insights into the importance of the emotional circuitry of the brain in leadership are vitally important in areas such as strategic decision making. (p. 168)

Goleman (2011) stated that, for individuals to make well-informed decisions, feelings must be present about one's thought process. Gilkey et al. (2013) explained, "This inner intrapersonal process of accessing feelings to have clear thoughts and make good decisions has far-reaching impacts interpersonally. While failure to process and incorporate feelings and emotional reasoning can have adverse effects on individual performance, it can also have negative consequences on organizational performance, notably in strategic leadership.

The regulation of emotion requires social, emotional, cultural, and conversational intelligence for growth and deep reflection. The intelligent school leader should be able to understand what others are feeling. When school leaders use emotion regulation to listen and understand the perspective of others, their listening can facilitate the professional development needs and growth of individuals, build strong relationships, and inspire positive brain circuitry in others. When individuals feel listened to and understood, their trust increases and their perception of a colleague as a fair, relatable leader solidifies. Sprenger (2010) explained,

Circuitry in the emotional brain combines information from facial expressions, voice recognition, and body movement to help keep you attuned to their feelings. Power comes from understanding relationships. Control belongs to every stakeholder. When you make others feel that they have some control over their lives and the power to make a difference, they follow your lead. The brain needs to feel in control, otherwise would be constantly stressed. (p. 139)

This finding is the key take-away piece for collaboration and influence.

Cultural Intelligence for Collaborating and Influencing Others

In the *National Board Certification for Educational Leaders: Accomplished Principals Standards*, the NBPTS (2010) explained that an effective school leader creates and designs strategic systems where both students and adults feel supported socially, emotionally, culturally,

and intellectually. SLQ identifies the skills and behaviors that school leaders need to ensure that all individuals feel valued in the school community. Keung and Rockinson-Szapkiw (2012) examined the relationship between cultural intelligence and transformational leadership and found that a positive relationship exists between the two constructs. Keung and Rockinson-Szapkiw (2012) stated,

Leaders who have a higher level of cultural intelligence exhibit a higher level of transformational leadership style, which suggests that individuals with high cultural intelligence are able to lead and to manage more effectively in multicultural environments. Behavioral cultural intelligence and cognitive cultural intelligence were found to be the best predictors of transformational leadership. (p. 836)

If individuals feel accepted, valued, and supported in an organization where interaction between individuals with different cultural perspectives are accepted, the behavior of the group drives and influences intercultural support and collaboration, creating a psychologically safe working environment.

As school environments become increasingly more complex, school leaders must develop social, cognitive, affective, and applied neuroscience skills to increase the interconnectedness within a school organization. When individuals are intrinsically motivated, their workplace performance and job satisfaction increases. However, a work environment must have the right conditions that encourage psychological safety. Iacoboni and McHaney (2013) explained that “Cultural neuroscience, with its ‘hard’ basis of research, can help create a deeper level of appreciation for cross-cultural differences in organizational leaders who work with people from different cultures. Earley and Ang (2008) defined cultural intelligence as an individual’s ability to function effectively in multicultural environments or contexts. The cultural intelligence scale comprised of four factors—cognitive, metacognitive, motivational, and behavioral—were used

in three primary studies for this systematic review. Collins (2015) researched the effects of school leader's cultural intelligence on Latino student achievement and indicated that multicultural skills are necessary for educators who work in classrooms that are culturally diverse. Collins (2015) explained, "Although it was limited in scope, this study identified direct significant influence of principals CQ [cultural intelligence] on Latino student achievement in math and language arts in eighth grade" (p. 474). In addition, Collins (2015) explained, "Culturally responsive principals and teachers can negotiate classroom cultures with their students that reflect the communities where students develop and grow embracing the sociocultural realities and histories of students through what is taught and how" (p. 468). Meyerson (2012) stated,

Findings suggest a principal's level of cultural intelligence may increase the effectiveness of the leader's abilities to relate to students, teachers, and community and to develop an atmosphere where those of diverse cultures and backgrounds want to not only be but want to perform as a part of the school community. (p. 133)

Dhaliwal's (2010) research findings provided important information to educators regarding the decision-making process for planning and collaboration. Regarding Dhaliwal's (2010) discoveries about cultural intelligence and leadership effectiveness, the author said, "Knowledge about a person's area of expertise, co-workers, and self are key elements for successful engagement" (p. 119). To substantiate these findings, Iacoboni and McHaney (2013) validated cultural intelligence findings from the three primary studies in this systematic review, explaining that the neuroscience of cultural intelligence is the process of thinking about oneself in relation to thinking about others, and that both forms of thinking require self-awareness and social awareness. Rockstuhl et al. (2013) stated,

Thus, culturally intelligent leaders do not simply assume that culturally diverse others think and feel in the same way as they do. Instead, leaders high in mental CQ assess the cultural differences between the self and others and adjust their ideations of others based on these assessments. (p. 388)

The art of collaborating and influencing individuals to understand their cultural differences in relation to others requires a school leader who is adept in multiple forms of intelligences and who can cultivate a culture of high expectations for acceptance of differences in ethnic backgrounds and cultural.

Effective school leaders who collaborate with others using SLQ unconsciously and proactively seek opportunities to work with individuals from different racial, ethnic, gender, religious, and social–economic backgrounds. Confidence in understanding ones SCARF position in relation to others’ SCARF position is the key to building strong collaborative relationships and influencing individuals horizontally and vertically throughout the organization. The summary of findings on influence and collaboration are shown in Table 16

Table 16

SCARF Behaviors That Are Aligned to the Applied Neuroscience Competencies of Influence and Collaboration

SCARF behavior	Applied neuroscience competencies of influence and collaboration
S-Status	Intellectual development and stimulation of self & others through peer support (Saxe, 2011).
C-Certainty	Teamwork involving the pursuit of shared goals by using group synergy (Saxe, 2011).
A-Autonomy	Self-reflects on effectiveness using community voice data (Meyerson, 2012).

R-Relatedness	Management of Relationships, and promotes teamwork and collaboration by managing conflict, using data, modeling leadership (Mason, 2018; Wendorf-Heldt, 2009).
F-Fairness	Uses individual social and cultural backgrounds and expertise (Collins, 2015; Khalifa, 2010).

Effective school leaders who use SLQ for decision making and problem solving, collaborating and influencing others, consider the impact of SCARF positions of all by skillfully tapping into the talents, expertise, skills, and abilities of individuals on staff and effectively relating to others to increase their motivation and sense of value within the organization. The feeling of being valued releases oxytocin in the brain, which is known as the feel-good hormone that can increase employee commitment, engagement, and productivity in the organization.

Social, Emotional, and Cultural Intelligence for Facilitating Change

According to NBPTS (2010) and its National Board Certification for Educational Leaders: Accomplished Principals Standards, accomplished school leaders have the skills to strategically facilitate the change process to achieve high levels of academic performance. Change facilitation requires school leaders to cultivate and develop the leadership capacity in others to lead for results while improving student learning. An effective school leader elicits and implements the ideas of others, using strategic skills to facilitate the change process. Wendorf-Heldt (2009) discovered when studying leaders' emotional intelligence that,

within the domain of relationship management, principals identified leadership practices such as celebrations at staff meetings, social gatherings, being approachable, doing kind things, staff recognition, communicating openly and honestly, supporting others through change, working through conflict, having the courage to confront, empowering others, developing the talents and skills of others, being inclusive, sharing in decision-making, creating collaborative cultures, and building and sustaining teams. (p. 160)

If an individual on staff feels threatened in relation to his or her school leader, the potential for a status threat is present. If a school leader fails to establish high expectations, using common and transparent language for planning for instruction, teacher dialogue for effective practice, observations, feedback, and evaluations, the school leader will create uncertainty that will ultimately lead to the reduction of one's autonomy and intrinsic motivation to commit. In addition, if school leaders are not aware of the formation of in-groups and out-groups according to the perception of others, they could potentially threaten positive relatedness within the school organization. Ultimately, as each domain spirals toward the threat circuitry of the brain, individuals within the school organization will perceive the school leader as being unfair and will not commit on the change process. Rock (2013) stated, "With all five domains under threat, the result may be minimal sharing of information, reduced accurate perception of the others' thoughts and intentions, and reduced creativity" (p. 345). When school leaders use strategic management and common language to ensure clarity, increase status, and build strong relationships, organizational trust will increase. Rock (2013) stated, "Research has shown that it is significantly more difficult for people to self-regulate when they are in a threat state" (p. 453). A summary of the research findings from the primary studies on change and facilitation is shown in Table 17. Rock (2013) expressed that it is important to think of ways to increase the reward response in the brains of others by making safe connections using relatedness skills that could include positive coaching and mentoring systems or buddy systems to increase workplace engagement. A direct relationship exists between SCARF and school leadership. School leadership drives individual and team performance, engagement, motivation, and school culture.

Table 17

SCARF Behaviors That Are Aligned to the Applied Neuroscience Competencies of Change and Facilitation

SCARF behavior	Applied neuroscience competencies of change and facilitation
S-Status	Systematic peer observations for culturally responsive pedagogy (Meyerson, 2012).
C-Certainty	Models passion; believes in shared leadership, strong communication skills; strong sense for advocacy, belief system that educators make a difference (Wendorf-Heldt, 2009).
A-Autonomy	Accepts change by demonstrating resiliency and flexibility; welcomes, encourages risk taking; and makes school environment safe to learn from mistakes (Saxe, 2011; Wendorf-Heldt, 2009).
R-Relatedness	Develops positive cultural community relationships (Wendorf-Heldt, 2009; Meyerson, 2012).
F-Fairness	Promotes fairness, equity, social justice (Wendorf-Heldt, 2009; Meyerson, 2012).

Study Limitations

There were limitations to conducting this systematic literature review. A vote-count method was employed to determine the quality of each primary study. The sample size was small; therefore, internal validity issues could exist. In addition, the researcher conducted the systematic review and coded each primary study. To ensure validity and reliability, a team of coders is preferential. To substantiate the findings in this systematic literature review, a meta-analysis using statistical measures is warranted for future research.

Conclusion

Glaser (2014) identified the importance of using conversational intelligence by understanding the wisdom and functionality of the five-brain system that the author identified as the reptilian brain, limbic brain, neocortex, prefrontal cortex, and the heart brain. Glaser (2014) explained that the reptilian brain or amygdala is activated when an individual is stressed or in fear. The limbic brain is activated when emotions are elicited through social interactions, relationships or when there is a feeling of expectations not being met. In addition, the neocortex is activated when individuals use their senses, memories, and experiences to understand, clarify, or figure out how to solve a problem. In addition, the prefrontal cortex (which houses the executive brain functions) is activated when empathizing, strategically thinking, assessing integrity or truth, and making complex decisions. Lastly, the heart-brain is activated when there is synchronization of other individuals' hearts and minds, releasing positive neurochemical messages to the prefrontal cortex promoting psychological safety, well-being, trust, and engagement in a workplace environment. The human brain is considered a social organ. Effective school leaders who facilitate change must create working environments that minimize the threat response by ensuring certainty for establishing high expectations. In addition, effective school leaders must increase the status of individuals who use talent and strategic management skills while encouraging autonomy through the modeling of persistence, stamina, and initiative and while leading for results to build a reflective culture for improving teaching and learning. More importantly, the effective school intelligent leader develops relationships by collaborating and influencing others to be internally motivated, engaged, and committed to the organizational goals. Lastly, the school leader models ethical, unbiased, and moral behavior using social, emotional, and cultural intelligence to achieve collective results for organizational success. In this study, the relationship between school leadership effectiveness and SLQ was examined by

employing the work of the NBPTS (2010) in its *National Board Certification for Educational Leaders: Accomplished Principal Standards*. The research on the interconnectedness of social, emotional, cultural, and conversational intelligences was aligned to the underpinnings of neuro-leadership as Rock (2013) defined it in the SCARF model and the competencies of applied neuroscience. In conclusion, from previous primary research studies, this systematic review provides evidence that SLQ is related to school leadership effectiveness. The SCARF model brings attention to the change facilitation process by considering the effects of increasing or decreasing one's SCARF position in relation to others within the school organization. *The National Board Certification for Educational Leaders: Accomplished Principal Standards* (NBPTS, 2010) for effective school leadership emphasizes the importance of leading with SLQ by identifying the following domains for neuro-educational leadership:

1. Status: The development of cognitive networks of the brain through differentiated professional growth strategies to increase certainty.
2. Certainty: The creation of a psychologically safe workplace to minimize threats to the limbic system to support autonomy.
3. Autonomy: The development of workflow systems to stimulate self-regulation of the brain for relatedness.
4. Relatedness: The development of relationships using SLQ and to increase awareness of fairness.
5. Fairness: The development of trustworthiness by modeling ethical moral behavior to increase.

The relationship between school leadership effectiveness and SLQ was examined by employing the work of *The National Board Certification for Educational Leaders: Accomplished*

Principal Standards (National Board for Professional Teaching Standards [NBPTS], 2010).

School leadership effectiveness requires school leaders to have the skills to strategically facilitate the change process by regulating emotions of self and others to achieve high levels of academic performance. Therefore, effective school leaders who use SLQ for decision making and problem solving by collaborating and influencing others increase the motivation levels, the feel-good oxytocin hormone, commitment, engagement, productivity and one's sense of value within the organization.

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APPENDIX A

SCARF AND SLQ CROSSWALK TO SCHOOL LEADERSHIP DIMENSIONS

SCARF Domain	Leadership dimension (behavior and practice)
School Leaders use applied neuroscience and SLQ (CQ, SQ, EQ) to:	
S-Status	Talent management
Cultivate, nurture, and develop the capacity of one's sense of importance to the school organization.	<ul style="list-style-type: none"> • leading for results • teaching & learning • knowledge of students and adults
C-Certainty	Establishing high expectations
Communicate and model a clear vision and beliefs to increase clarity and commitment to organizational success.	<p>Instructional leadership</p> <p>Strategic decision making and problem solving</p> <ul style="list-style-type: none"> • teaching and learning • knowledge of students and adults • culture • strategic management
A-Autonomy	Persistence, stamina, initiative
Encourage forward thinking by giving individuals a sense of freedom and control over organizational outcomes.	<ul style="list-style-type: none"> • leading for results • teaching and learning • culture

R-Relatedness**Building relationships influencing others**

Establishes trust by ensuring each individual has a sense of belonging and security in the school organization.

Talent management

- leading for results
 - teaching and learning
 - knowledge of students and adults
-

F-Fairness**Belief in children**

Models unbiased, moral, and ethical behaviors through human interactions.

Integrity

- leading for results
 - knowledge of students and adults
 - teaching and learning
 - culture
 - advocacy
 - ethics
-

APPENDIX B

THEMATIC CODING GUIDE ALIGNED TO ROCK'S SCARF MODEL:
 A SCARF CROSSWALK WITH THE *NATIONAL BOARD CERTIFICATION FOR
 EDUCATIONAL LEADERS: ACCOMPLISHED PRINCIPALS STANDARDS*

SCARF – As a leader I:	C&I/ D&P/ FC/ ER/ SLQ	I: “establish committees of internal and external stakeholders to provide guidance for initiatives and programs”
S-Status Develop, build, and nurture the capacity of individuals sense of importance relative to others	D&P C&I Standard I: Leadership for results • Working collaboratively • Building organizational capacity Standard III: Teaching and learning • Planning for learning • Collaboratively implementing curricula Standard IV: Knowledge of students and adults • Understanding of human development and learning theory	I: “establish committees of internal and external stakeholders to provide guidance for initiatives and programs” • “develop the supervisory skills of a custodian, enabling the custodian to move from doing his or her own job well to leading others in doing their jobs well” • “access and use the professional expertise in the networks within and outside the learning community” • “empower others to solve challenges to learning” • “Understanding that staff members are on a continuum of development, accomplished principals provide thoughtful support for all staff members at every stage of practice” • “Model, coach, mentor” • “appreciate each individual’s unique needs and strengths and consider him or her when planning activities and events” • “apply their understanding of adult learning theory and human

		<p>development, acknowledging what each person brings and how each person's social construct affects the learning environment"</p> <ul style="list-style-type: none"> • "differentiate staff members' professional development based on interests, needs, and technological expertise"
C-Certainty	FC	I:"effectively communicate the focus on learning and engage support for the learning process"
Have a clear vision and belief system to increase individual's clarity to make organizational predictions	<p>Standard III: Teaching and learning</p> <ul style="list-style-type: none"> • Planning for learning • Collaboratively implementing curricula • Continuously monitoring, evaluating, and adjusting performance <p>Standard IV: Knowledge of students and adults</p> <ul style="list-style-type: none"> • Understanding of human development and learning theory <p>Standard V: Culture</p> <ul style="list-style-type: none"> • High expectations • Collaborative and collegial relationships <p>Standard VI: Strategic management</p> <ul style="list-style-type: none"> • Design and develop: plan 	<p>I:"effectively communicate the focus on learning and engage support for the learning process"</p> <ul style="list-style-type: none"> • "actively engage all stakeholders in formal and informal dialogue, building a sense of urgency and ownership in the pursuit of established learning goals" • "apply their thorough understanding of the complexity of pedagogy to support teachers in making informed choices about matching instructional strategies to the curriculum" • "provide teachers with professional learning that is aligned with the vision, goals, and objectives of the organization. They continually evaluate the learning opportunities provided to staff members and listen to staff members to ensure that professional learning meets individual needs and improves student learning. They design structures, so teachers can systematically and regularly observe each other's work and share effective practices" • "articulate a clear theory of action to explain why strategies are expected to lead to desired results and to identify sources of evidence that are acceptable markers of success"

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- “Am skilled in disaggregating and interpreting data for the purpose of analyzing areas of strength and growth and determining paths to improvement in learning”
 - “demonstrate transparency by continually communicating the results of individual students’ and school-wide performance”
 - “reinforce high expectations for adults, so adults will have high aspirations for themselves and a personal sense of efficacy”
 - “develop a collective sense of high expectations, resulting in a high-performing organization where all students learn.”
 - “lead the creation of a culture that generates excitement, encourages innovation and experimentation, and develops commitment—making continuous improvement and maximum effort the norm”
 - “safeguard a culture that values individuals, strives for maximum learning for students and adults, and structures a productive and orderly environment”
 - “foster a culture that emphasizes a collaborative spirit within the learning community”
 - “lead the development of goals and objectives that are in line with the vision and mission”
 - “ensure that communication about systems and stakeholder access and utilization occurs on a timely basis. They strategically conduct public meetings”
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- “communications are intentional, clear, consistent, and focused on results”
 - “monitor the systems and processes against established goals and objectives, using all available resources and technologies”
 - “design each monitoring effort to ensure equity and guarantee that all are justly served”
 - “establish real-time and longitudinal data collection systems to monitor progress and trends to inform decisions. “
 - “develop processes and protocols for using the student data management system to monitor the instructional program effectively”
 - “use the management structure to disaggregate data from all groups and determine further actions or interventions”
 - “lead a gap analysis with teachers to determine why a particular sub-population is achieving and another is not in relation to an established expectation. “
 - “analyze the results and use the findings about the root causes to develop a strategic plan and implement interventions”
 - “use monitoring process to build greater ownership and commitment throughout the organization for the attainment of goals and objectives”
 - “support continuous improvement, regularly review, evaluate, and re-examine systems and processes, identifying obstacles and barriers,
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		and minimizing or eliminating them.”
		<ul style="list-style-type: none"> • “collaboratively prioritize actions to arrive at what is critical to achieving the goals.” • “regularly review and evaluate formal and informal processes”
A-Autonomy	D&P	I: “Provide common Language for instructional quality to support engagement & reflective practice to engage in self-reflection, conversation, practice, observation, evaluation, feedback”
Give individuals sense of control over events and they feel they can influence the outcome	FC	
	Standard I: Leading for results	
	<ul style="list-style-type: none"> • Achieving results 	
	Standard III: Teaching and learning	<ul style="list-style-type: none"> • “set targets, address challenges, and analyze data to drive their decisions”
	<ul style="list-style-type: none"> • Planning for learning • Continuously monitoring, evaluating, and adjusting performance 	<ul style="list-style-type: none"> • “building relationships, developing common understandings of effective teaching practices, and communicating clear expectations of performance”
	Standard V: Culture	
	<ul style="list-style-type: none"> • High expectations • Collaborative and collegial relationships 	<ul style="list-style-type: none"> • “foster an environment that values effort, persistence, and engagement by all students and staff”
R-Relatedness	C&I	I: “provide the resources for a group of teachers to work together to develop effective teaching strategies for targeted populations”
Linked to Trust	Standard I: Leadership for results	
Ensure a sense of belonging & security with the organization/group	<ul style="list-style-type: none"> • Working collaboratively • Building organizational capacity 	<ul style="list-style-type: none"> • “provide professional development to support teachers in acquiring the appropriate skill set for working with adults.”
	Standard III: Teaching and learning	
	<ul style="list-style-type: none"> • Planning for learning 	<ul style="list-style-type: none"> • “collaborate with others to ensure that materials, support, and training are relevant and appropriate, incorporate high expectations, and reflect a balanced curriculum”

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- Collaboratively implementing curricula
 - “seek and welcome feedback and input from diverse sources, with the aim of continuously improving learning”
 - Continuously monitoring, evaluating, and adjusting performance
 - “structure time and resources to support teachers to work collaboratively in examining student work, in holding professional conversations, and in adjusting their teaching practices accordingly”
- Standard IV: Knowledge of students and adults
- Understanding of human development and learning theory
 - “adept at assisting teachers with analyzing data and identifying opportunities for improvement and for sustaining successes”
 - Scaffolding support
 - “collaborate with others to collect and analyze information from multiple sources—qualitative and quantitative, formative and summative. Work to keep data as a focus on a to monitor and evaluate student performance and to inform teacher practice at the classroom level.”
 - Celebrating adult accomplishments
 - “Collaborate on formal and informal classroom observations, student work evaluations with teachers, and comprehensive evaluation conferences”
 - “deliberately design and implement systems and procedures to engage each adult”
 - “intentionally and purposefully build trusting relationships, enabling them to have conversations that are courageous and honest”
 - “actively listen, observe, and value the power of meaningful communication with adults”
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		<ul style="list-style-type: none"> • “understand, communicate with, and effectively interact with people across diverse cultures” • “ensure that every adult feels like an integral part of the learning community and understands how his or her learning is important to them personally and to others. “ • “understand that underperformance may occur because of a variety of professional and personal factors and counsel individuals when they perceive changes in demeanor or performance” • “realize that adult recognition is important and regularly acknowledge adults in meaningful ways.” • “celebrate personal and professional milestones that adults attain”
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F-Fairness	Social emotional cultural regulation	I: “provide background and communicate transparently when faced with a challenging or controversial decision that is in the best interests of academic achievement, these principals explain the context of the situation.”
Demonstrate moral ethical behaviors & show unbiased interactions	Standard I: Leading for results <ul style="list-style-type: none"> • Leading by example 	
Draw on insight & experience	Standard III: Teaching and learning <ul style="list-style-type: none"> • Planning for learning 	<ul style="list-style-type: none"> • “use and model appropriate social emotional cultural strategies and conversational skills in various situations to achieve successful student outcomes”
	Standard IV: Knowledge of students and adults <ul style="list-style-type: none"> • Understanding of adults in a broader context 	<ul style="list-style-type: none"> • “work with staff members to ensure they are proficient in culturally relevant practices”
	Standard V: Culture <ul style="list-style-type: none"> • High expectations 	<ul style="list-style-type: none"> • “recognize and acknowledge their own obligations and limitations in

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- Collaborative and collegial relationships
 - Nurture relationships. They do not show bias or favor”
 - Respect for cultural differences, diversity, and equity
 - “address individuals who act contrary to the norms by initiating critical conversations designed to maintain a cohesive culture of learning”
 - A safe and trusting environment
 - “build systems that incorporate qualitative and quantitative data to monitor and assess the culture, gathering such data through formal and informal means.”
- Standard VII: Advocacy
- Standard VIII: Ethics
- Demonstrating personal and professional ethics
 - “use data to initiate critical discussions aimed at enhancing adult practices and student behaviors that are necessary for a trusting, effective culture”
 - “collaboratively establish and implement policies, systems, and procedures that promote respect for diverse cultures, ethnicities, and lifestyles, including underrepresented segments of the learning community”
 - “identify values and behaviors related to eliminating bias, intolerance, and inequity “
 - “respect the cultural differences in a global society and make diversity a means for enriching the culture of the learning community. “
 - “work to establish a culture in which students find relevancy and are both intrinsically and extrinsically motivated to succeed”
 - “celebrate diversity as a strength and as a tool for learning and growing. “
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- “analyze and monitor classroom activities and assignments for cultural sensitivity and relevance. “
 - “respect elements of student culture that support and are relevant to the learning environment”
 - “know that physical, emotional, and intellectual safety and well-being for students and adults are essential in building an atmosphere of high expectations”
 - “foster a secure environment in which mutual respect is the cornerstone of the culture”
 - “develop structures to ensure safety and have monitoring systems and plans in place. “
 - “create and execute viable discipline plans that are fair, known by all, and consistently applied and reviewed”
 - “ exude a sense of calm, confidence, and adaptability when dealing with stress and managing crisis”
 - “establish trusting relationships with all”
 - “advocate for staff members so that they feel supported when someone challenges decisions the staff members have made in the best interest of students”
 - “committed to the integrity of the decision-making process. make decisions honestly and transparently and communicate them skillfully”
 - “clearly communicate ethical expectations and ensure those
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expectations are aligned with the vision and mission of the learning community”

- “resolve conflicts in a way that communicates strong ethics while maintaining respect for all individuals”
- “use ethical challenges to facilitate teachable moments.”
- “create psychologically safe and professional environments to discuss and resolve ethical challenges related to the learning environment”
- “hold all staff members to the same level of expectation, regardless of their personal beliefs and possible biases”
- “examine their practice through the lens of equity, fairness, and justice”

Note. C&I = collaborating and influencing others; D&P = decision making and problem solving; ER = emotion regulation; FC = facilitating change; SLQ = Applied neuroscience (school leadership intelligence). SOURCE: National Board Certification for Educational Leaders: Accomplished Principal Standards (NBPTS, 2010)

APPENDIX C

INSTITUTIONAL REVIEW BOARD APPROVAL



Institutional Review Board
Mary DeSilva Chair

Biddeford Campus
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To: Sheria Pope

Cc: Michelle Collay, Ph.D.

From: Lliam Harrison, M.A., J.D. CIM

Date: July 12, 2019

Project # & Title: 19.07.12-005 A Systematic Literature Review of School Leadership Intelligences for the Development of Neuro-Educational Leadership

The Institutional Review Board (IRB) for the Protection of Human Subjects has reviewed the materials submitted in connection with the above captioned project and has determined that this work is not human subject research as defined by 45 CFR 46.102(e)(1) & (e)(2).

Additional IRB review and approval is not required for this protocol as submitted. If you wish to change your protocol at any time, you must first submit the changes for review.

Please contact Lliam Harrison at (207) 602-2244 or wharrison@une.edu with any questions.

Sincerely,

A handwritten signature in black ink, appearing to read "William R. Harrison".

William R. Harrison, M.A., J.D. CIM
Director of Research Integrity

IRB#: 45 CFR 46.102(e)(1) & (e)(2).

Submission Date: 07/09/19

Status: Not Human Subject Research, 45 CFR 46.102(e)(1) & (e)(2). .

Status Date: July 12, 2019