A CURRICULUM DESIGNED TO FOSTER SELF-REGULATION IN STUDENTS WITH NEUROBIOLOGICAL IMPAIRMENTS

by

Leah M. Kuypers

A capstone submitted in partial fulfillment of the
requirements for the degree of Master of Arts in Education

Hamline University

Saint Paul, Minnesota

December, 2008

CHAPTER TWO: REVIEW OF LITERATURE

Introduction

In order to answer the question *how do I develop a curriculum to teach students with neurobiological impairment to self-regulate*, it is imperative that I review the research pertaining to this topic. To do this, I will examine the literature and research in the following areas:

- Self-regulation including: typical development of self-regulation from infancy to adolescence, neurology, executive functioning, emotional regulation, and sensory integration theory
- Neurobiological disorders, specifically autism spectrum disorders and attention deficit hyperactive disorder as related to deficits in self-regulation; and,
- Learning styles and teaching strategies for students with neurobiological impairments

First and foremost, it is essential that I define and provide background information on self-regulation within the context of the curriculum I will develop.

Development of Self-Regulation

Self-regulation can go by many names, such as self-control, self-management, anger control and impulse control; however, for the purposes of this inquiry, self-regulation will be used and will be defined as "the ability to attain, maintain and change arousal appropriately for a task or situation" (Williams & Shellenberger, 1994, p.1-5). Typically, as children age and mature, so do their skills in self-regulation. There are several competing psychological theories and neurological theories of how self-regulation develops and the terms may vary depending upon which frame of reference one uses. Given the neurological etiology of the disorders in the

population that the curriculum is geared toward, I will closely examine the theories that are neurobiological based.

In order to determine which children are having difficulties with self-regulation, one must first understand the typical development of self-regulation from infancy. When considering infants and small children, it is given that they are heavily dependent on external regulators, such as their caring parents or attentive babysitters, to meet their needs. As children age, they become more capable of handling challenging circumstances and are able to demonstrate age appropriate responses and solutions. Bronson, who compiled extensive theoretical work and research into her book *Self-Regulation in Early Childhood* (2000), asserts that it is during early childhood that children make significant gains in regulating their arousal, emotional responses, control over their mental processing such as problem solving, and motivational patterns; but let's take a closer look at how these processes develop.

According to Bronson (2000) and other professionals in the field of self-regulation (Neisworth, Bagnato and Salvia, 1995), the most respected and widely known the overview of the early phases of development of self-regulation account is offered by Claire Kopp. In Kopp's journal article, *Antecedents of Self-regulation: A Developmental Perspective* (1982), she puts forth a developmental progression, based on theory and research, that she terms "phases of control" which explains the gradual transitions that build upon each other in order to achieve self-regulation. Kopp's first phase, termed neurophysiological modulation, occurs from birth to approximately the second or third month of infancy. During this time, Kopp explains infants have to modulate arousal states as a way to protect themselves from stimulation. Two examples of this are when babies fall asleep when in an over-stimulating sporting event or suck on a pacifier to self-sooth. According to Kopp, infants demonstrate organized movement patterns, or

reflexes, during this time. Kopp's second phase, sensorimotor modulation, starts around the third month and lasts through the ninth to twelfth month. During this time, Kopp states infants develops the ability to change their behavior in response to an event and stimuli, such as when a baby is drawn to his mother's activity and will reach for what his mother has just set down. When infants become aware that they can change their actions from those of others, Kopp feels they progress into the next phase, control. At this point, Kopp asserts children demonstrate an emerging awareness of social and task demands that are set by the caregivers. Kopp goes on to explain that children attempt to initiate, maintain, modulate or cease their behavior according to social or task demands, as well as begin to notice the effects of his actions. During this time, Kopp points out there is significant cognitive growth in intentionality, goal-directed behavior, conscious awareness of actions, and memory of self. Kopp continues to explain that the children's' opportunities to notice the effects of their attempts at social interactions are critical during this time. Children become more aware of caregivers' wants and guidance the children receive from caregivers helps progress them into Kopp's next phase, self-control.

According to Kopp (1982), children progress into the self-control phase around two-years of age. During this time, Kopp theorizes children develop the ability to delay action when requested and behave according to caregivers' or social expectations despite the lack of external monitors. Kopp states that as compliance and internal self-monitoring emerge, so does the cognitive requisites of emerging language, representational thinking, symbolic thinking and memory recall. Kopp asserts children begin to demonstrate impulse control, with the degree of success impacted by the caregivers' sensitivity to the child's needs and characteristics. Children continue to develop their sense of self and identity as they move into Kopp's final phase, self-regulation. Kopp suggests that during children's third and fourth-years, they gain greater

flexibility and adaptability of control processes so that they are able to change in order to meet the situational demands. According to Kopp, children begin to use rules to guide behavior. She goes on to explain that as children gain understanding of the standards and expectations of appropriate behavior, they attempt to approximate their behavior to meet the standards. Kopp recognizes that in the phase of self-regulation, children develop the ability to produce strategies which reduce tension and increases their conscious introspection and reflection of their behavior.

Kopp (1982) takes into consideration the influence of external influences on the development of self-regulation. Kopp cites various research findings supporting her theory that caregivers influence individual differences in the development of self-regulation, given caregivers' different expectations, verbal techniques and behavior management strategies. Kopp also attests to the effect of stressful events during early childhood on the development of self-regulation. Kopp states the need for more research in the field to provide additional elaboration on the phases, the cognitive constituents, and the effects of external influences on a child's development of self-regulation.

Another theory of self-regulation development is offered by Oetter, Richter, and Frick (1993), all who specialize in sensory integration theory and practice. The authors organized the development of typical self-regulation into three functional levels or orders. First order self-regulation occurs during infancy and it is during this time that the automatic functions of the body develop as the autonomic nervous system, reticular system and limbic system in the brain mature. Automatic functions developing during this time include those required to maintain homeostasis (respiration, heart rate, digestion, immune systems, temperature regulation, and sleep-wake cycle) as well as muscle tone, state maintenance and monitoring for survival.

As the infant moves into the second order of self-regulation development, Oetter et al. (1993) lists the child developing organized outputs ranging from selective attention, vocalization, visual pursuits, movement patterns, and the ability to maintain and adapt states of arousal that are appropriate to different situations. The authors describe the child depending on sensory-motor input and feedback to help them organize their state of arousal, but also note that even adults continue to use similar strategies to aid in self-regulation, such as biting on pens, fidgeting with keys, or swinging their foot.

Oetter et al. (1993) assert the third order of self-regulation skills emerges later in childhood. Higher level cognitive skills develop that allow the child to self-monitor, recognize when their state of arousal needs to be adjusted, organize language for functional use, sustain attention and tap into working memory. It is during the third order the child starts problem solving, and as Oetter et al. suggest, the child gains the ability to plan in anticipation of an event, as well as, formulate, execute and evaluate strategies that they used.

When comparing the two theories, with the exception of Oetter's first order of development occurring during infancy, I feel one area where Oetter's explanation of development falls short in that the authors are vague on age benchmarks for the second and third order of self-regulation development (Oetter et al., 1993). One is better able to assess where a child is in his or her development of self-regulation skills using Kopp's phases of control (1982). In both developmental theories, it is apparent that orders or phases build off each other in that the child utilizes the skills developed in one phase/order to further refine and build from in the next phase/order. Although the theories differ, all can agree that the self-regulation abilities of a toddler look much different than an adolescent and our expectations for children to independently self-regulate increase as the child ages.

When a child's ability to self-regulate does not develop in a typical fashion, he or she will be at risk for a multitude of problems. Recognizing a pattern of atypical development in self-regulation in children zero to three years old, Stanley Greenspan termed the infants experiencing problems with sleep, feeding, state control, self-calming, sensory reactivity, mood regulation and emotional and behavioral control as having regulatory disorder (Zero to Three, 1994). In a study conducted by DeGangi, Breinbauer, Roosevelt, Porges and Greenspan (2000), the authors found that a moderate regulatory disorder during infancy was a predictor for developing a range of behavioral problems by 36 months including depression, sleep problems, somatic problems, sensory integration problems and aggression. DeGangi et al. also found that the children who were rated as having a moderate to severe regulatory disorder during infancy were significantly more likely to have one or more diagnoses in the *Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM-IV)* at 36 months. Diagnoses included one or more of the following: pervasive developmental disorder (PDD)/autism, regulatory disorder, sleep disorder, developmental coordination disorder, expressive and/or receptive language disorder, mental retardation or borderline intelligence, parent-child relational problem, and sensory integrative disorder. Implications of the study by DeGangi et al. included needing to specify the definition of regulator disorder in the zero to three population and further study the clinical significance of regulator disorders with larger samples. This study supports the notion that the phases or orders of self-regulation build upon each other, so when the infant is having difficulty meeting the early self-regulation milestones, there are long- term effects on the child's development and behavior.

Kopp and Oetter's theories on self-regulation development account for development occurring between infancy through early childhood, but lack connections to the coinciding neurological development of the brain, as well as fail to expand on self-regulation beyond early

childhood. These gaps are filled by Marc Lewis and Rebecca Todd's work in the area of cognitive development and the self-regulating brain (2007). They examine self-regulation from birth through adolescence while considering the impact of the involved neurological processes as they mature. Lewis and Todd consider the period between the ages of three and six as when the epicenter of self-regulation shifts from the subcortical area of the brain (brainstem and amygdale) to also include what will become the more predominate cortical control system generated from the anterior cingulate cortex (ACC) of the prefrontal cortex. When the subcortex is in control and calling the shots, Lewis and Todd point out that attention, perception, thought and action are based on needs, concerns, attractions and other impulses that one is not able to override. It is also the subcortex neural systems that assign emotional significance and meaning to events. As the ACC gains control, one becomes better equipped to override the urges and emotional impulses through intelligent actions such as planning, set shifting and context-update. These skills associated with the prefrontal cortex, as well as others, are commonly referred to as executive functioning and are widely cited as critical skills needed to successfully self-regulate. Executive functioning will be expanded on as we continue to examine self-regulation. Also between the ages of three and six, Lewis and Todd note the child develops a greater capacity for conscious perspective taking and enhanced social and emotional awareness.

As children move toward adolescence, their brains are continuing to develop, particularly in the prefrontal cortex. Lewis and Todd (2007) cite a study that indicates that working memory and manipulation of information continues to improve through adolescence, and argue that adolescents increase their cortical efficiency and refine their ability to self-regulate. Offering an explanation for the rapid increase of emotional reactivity during puberty, Lewis and Todd weigh the gradual development of the ACC when confronted with the complex emotional experiences

adolescents have to navigate through. As the adolescent is able to balance the epicenters of self-regulation and has their own unique emotional expressions and interpretations set, the personality style of the young adult becomes evident.

Lewis and Todd (2007) point out that although some of the neurological processes are primitive in nature or automatic, while other processes are subject to voluntary control, the neural systems are constantly interacting and coordinating with each other to produce emotional and cognitive activity involved in self-regulation. They highlight that the epicenters of self-regulation may shift based on the environmental demands and optimal self-regulation is achieved when the subcortical and ACC systems can be in tune and synchronized with each other. Lewis and Todd speculate that psychopathologies are secondary to a lack of harmony between the epicenters causing an imbalance of neural systems. Lewis and Todd assert that there is a lack of research in the area of neural systems and their impact on the development of self-regulation. They call for more theoretical work in this area.

Components of Self-Regulation

Executive Functioning

Executive function, a component of self-regulation, is an umbrella term that describes the cognitive processes involved in the conscious control of thoughts and actions (Liebermann, Giesbrecht & Muller, 2007) and according to Lewis and Todd (2007) is regulated in the prefrontal lobe. When executive functions are working appropriately, the child will be able to demonstrate better skills in self-regulation. There are numerous mental operations that fall under executive functioning, but most notable are attention shifting, working memory, internalization of speech, and inhibition. Whether inhibition is an executive function, or the

precursor necessary for optimal executive functioning to occur, is debatable. In 1997, Russell A. Barkley released "Behavioral Inhibition, Sustained Attention, and Executive Functions: Constructing a Unifying Theory of ADHD" (1997) that was based on the previous work of numerous authors, as well as on his own work and beliefs. This unifying theory which closely examines executive functioning, behavior inhibition and sustained attention is widely recognized and cited in the area of self-regulation. Barkley's thorough and respected work asserted him as the leader in the theory of and research on ADHD, but his contributions in the area of self-regulation have also been noted. Barkley argues that behavioral inhibition does not constitute the executive functions to occur, but sets the state for their occurrence, while Leibermann groups inhibition with the other cognitive operations making up executive functioning that is essential for self-regulation.

Taking a closer look at the operations of executive functioning, Liebermann et al. (2007) describes attention shifting as the ability to switch back and forth between numerous tasks, mental sets, and operations. An example of this would be the ability to take notes while listening to the teacher lecture. Working memory, or "updating" as referred to by Leibermann et al., is constantly used to monitor and code the novel information that one gathers. It is responsible for replacing old irrelevant information with new, updated information. Barkley (1997) argues that working memory allows one to hold events in mind, manipulate or act on events, imitate complex behavior sequences, have hindsight and foresight, an anticipatory set, a sense of time and allow for cross temporal organization of behavior. Internalization of speech, as asserted by Barkley, is responsible for description, refection, self-questioning, and allows for the creation of new rules that assist in guiding behavior. In turn, this creates greater self-restrain and self-guidance. Inhibition, as defined by Leibermann et al., is the ability to restrain or stop the

automatic and dominant impulse responses that as Lewis and Todd (2007) pointed out are generated in the subcortex area of the brain. When these cognitive processes are functioning adequately, a child will be able to complete the problem solving necessary to jump the hurdles he or she meets.

Emotional Regulation

Leibermann et al. (2007) feel that there are two processes that constitute self-regulation: executive functioning and emotional regulation. They define emotional regulation as processes (both intrinsic and extrinsic) that are responsible for controlling the emotional reactions in order to met one's goal. This would include monitoring, evaluating, and modifying the intensity and temporal features of one's emotional response. In Barkley's theory asserts that once involuntary emotions are elicited, they are modulated by executive functions (1997). He argues that this allows one to not only self-regulate their emotional response, but also to induce emotional states that are in the best interest of the goal-directed behavior. Barkley also includes other subfunctions into the emotional regulation component: self-regulation of motivation and drive, a capacity for objectivity, the self-regulation of arousal and social perspective taking. Social perspective taking is also commonly referred to as "theory of mind" and discussed later. Barkley points out that as children learn it is more socially appropriate to have positive emotional and motivational states, children are able to replace initial angered or frustrated negative states with more positive emotional and motivational states of arousal. Also heavily weighing in on what constitutes emotional regulation, The SCERTS Model (Prizant, Wetherby, Rubin, Laurent & Rydell, 2006) is a comprehensive approach designed to aid in the education of children on the autism spectrum. The model addresses three domains that the authors feel are critical to the

success of students with ASD: social communication, emotional regulation, and transactional support. In compiling a plethora of research on emotional regulation, the authors divided emotional regulation into five dimensions. The first dimension offered by Prizant et al., cognitive appraisal, describes a person's ability to read and comprehend the social and emotional cues from others, as well as reflect on his or her own emotional state. The second dimension offered by Prizant et al., physiological aspects of emotions, refers to the body changes that occur when experiencing emotions. The third dimension that authors recognize, emotional expression, is used to describe how emotions are relayed to others via verbal language and/or paralanguage. Paralanguage is a term used to describe nonverbal communication, such as body language, facial expression, voice tone and gestures. The fourth dimension of emotional regulation described by the authors is socialization. Prizant et al. view this as the ability to respond appropriately to the emotional expressions of others. The final dimension offered by the authors is regulation of emotional and mood states, which describes the ability to change an emotional response or mood so it aligns with the situation. The authors also refer to this component at recovery from dysregulation. Given the three theories on emotional regulation differ, it is clear that additional research and theory development is needed in this area. What cannot be disputed is the impact emotional regulation has on one's ability to self-regulate.

Sensory Integration

Sensory integration (SI) is a theory and treatment method developed by Dr. Jean Ayres, a psychologist and occupational therapist interested in neuroscience. Through her studies, she recognized patterns of dysfunction among the children with learning disabilities as related to their processing of tactile, vestibular, proprioceptive and visual input. These dysfunctions

appeared to lead to deficits in motor planning, language, behavior, cognition and emotional well-being. From these observations and through data analysis, Ayres (1979) introduced the theory of sensory integration and defined it as "the organization of the senses for use" (p. 5).

In order to integrate sensory information, one first must *register* the information. Sensory registration refers to the threshold that needs to be reached so the central nervous system can respond and decide if to act on it (Myles, Cook, Miller, Rinner and Robbins, 2000). If a child experiences a low threshold, it takes very little sensory input for the child to react. On the opposite end of the spectrum, if a child experiences a high sensory threshold, he or she will need a lot of a sensation before responding. Thresholds differ per sense, such as one could have a low threshold for tactile input, therefore often reacting defensively to touch; and then have a high threshold for vestibular input, therefore frequently seeking out movement. Thresholds levels change throughout the day, depending on emotional state, level of stress, amount of sleep, time of day, etc… According to Myles et al., after registration occurs, one will *orientate* or focus on the input, leading then to *interpreting* it. This may elicit an emotional response, such as when you hear a fire alarm go off, you interpret it as danger. At that point, *organization* occurs and one determines if a response is necessary, such as considering fleeing the building. In the final stage of sensory integration, a *response* is carried out, which could include doing nothing, but in the case of a fire alarm ringing, hopefully means quickly walking to safety.

The senses tell us all information about the physical condition of our bodies and environment. In taking a more in-depth look at how one processes the senses Ayres (1972, 1979) asserted that sensory intake and integration must happen within the lower, subcortical part of the brain. She explained that the higher cognitive centers of the brain, such as the prefrontal cortex, are dependent on the integrity and integration of the information from the sensory

systems in order to move and behave normally. Murray-Slutsky and Paris (2000) stated that the multiple functions of the brain are impacted neurologically by the integration of the sensory information. Specifically, emotions and behavior are directly influenced, as these functions are processed in the same areas of the brain as sensory input is organized. In other words, the more efficient one is at integrating sensory input, the more efficient one will be at executive functions and emotional regulation. These components therefore influence each other and impact one's ability to self-regulate.

Expanding on Ayres' theory of sensory integration, Oetter, Richter and Frick (1993) and Williams and Shellenberger (1994) provide more analysis on sensory integration and examine the concept of arousal. Oetter et al. define arousal as the state of the nervous systems that is able to prepare the body for orientating to sensory stimuli or more simply, one's level of alertness. One's level of arousal will depend on the situational demands and influences one's ability to attend and concentrate. Williams and Shellenberger contend one must be in an optimal state of arousal to successfully meet the demands of the task and in order to do this one must be able to self-regulate in order to achieve the optimal state of arousal to support the demand. Oetter et al. state that each person must have their sensory diet needs met, so that he or she is at the appropriate level of arousal needed for sustained attention which in necessary for learning.

Sensory integration automatically develops in typical children, however, when a brain is not able to make sense of or organize the sensory input coming in, the child will experience sensory integrative dysfunction. When this happens, Murray-Slutsky and Paris (2000) point out that the child will experience inconsistencies in performance, given the day, environment, demands, etc. The problems the child experiences are influenced by which senses the child is having difficulty integrating. Typical problems may include fine and gross motor issues,

incoordination, poor body awareness, oral motor issues, and emotional, behavioral issues. More specifically, emotional-behavioral issues that result from sensory integrative dysfunction may include disorganized emotional states, inconsistent emotions, withdrawal or avoidance, self-stimulation, aggression, difficult focusing and self-injurious behavior. It is clear that in order to improve self-regulation, we must ensure that a child's underlying sensory needs are being addressed.

Prizant et al. (2006) argue that adaptive functioning occurs when one is able to pair emotional regulation skills, such as behavioral, language and metacognitive strategies, with the ability to modulate ones state of arousal. As Prizant et al. aptly phrased it, "physiological arousal, emotional arousal and emotional regulatory abilities have a cumulative impact on a child's attention, availability for learning and ability to engage in social activities" (2006, p. 53). Through the research, it is apparent that successful self-regulation is dependent on efficient executive functioning, skilled emotional regulation and accurate sensory integration and regulation. Given the interrelatedness of these three components, it is easy to see that if children experience difficulty in any one area, their ability to self-regulate will be impacted.

Autism Spectrum Disorders and Self-Regulation

In 1943, Leo Kanner was the first to describe a group of children with social withdrawal and atypical behaviors (Frith, 1989). Concurrently and unaware of Kanner's work, Hans Asperger was also publishing his detailed observations of children that shared common characteristics in their physical appearance, expressions and behavior. He initially termed these children as having "autistic psychopathy", but more recently, the children displaying these recognizable symptoms have come to be termed as having Asperger Syndrome (Myles et al.,

2000). Both pioneers in the field coincidently used the term 'autistic' to describe the population that now would be classified by the *DSM-IV* (American Psychiatric Association, 2000), as having a pervasive developmental disorder. Asperger's disorder and autistic disorder fall under pervasive development disorder, as well as four other disorders that are commonly coined as autism spectrum disorders. These disorders are characterized by three core features including: qualitative impairments in reciprocal social interaction skills; communication skills; and restricted and repetitive patterns of behavior or interests. In addition, the age of onset for the disorder usually occurs before the age of three. Asperger's disorder differs from autism disorder in that language development is typical and the disorder may not be detected in early childhood. Since Kanner and Asperger, many others have gone on to study the multifacets of autism, yet the disorder continues to have many unanswered questions.

In David Amaral's lecture titled *An Overview of Current Research on Autism Spectrum Disorders* (2008), he spoke of numerous research projects which are studying the brain's development and pathology as related to autism. Ameral highlighted promising findings regarding the amygdala and abnormal growth; the development of the frontal lobe and too much white matter; the cerebellum and fewer purkinje cells; and increases in glia cells indicating an inflammatory process. Researchers are still not able to answer the question of 'what causes autism', but there is now evidence of neurobiological differences in people with autism's brains.

Given the evidence of neurological dysfunction in the areas of the brain where self-regulation is coordinated, other researchers have gone on to study the behavioral implications in people with autism. The DSM-IV (1994) describes a myriad of behavior symptoms that are consistent with poor abilities to self-regulate, including: hyperactivity, short attention span, impulsivity, aggressiveness, self-injurious behaviors and temper tantrums. Gomez and Baird

(2005) used a behavior rating scale to compare reports from parents of typical developing children with those from parents of children with autism. They found that children with autism are demonstrating significantly more difficulties in the area of self-regulation than a neurotypical peer by one year of age. Their research also suggested that self-regulatory difficulties in one year olds may be an early risk factor for later developing pathologies, including autism. The author cites limitations in the study, including a low return rate of study packets and inadequate representation of the general population. Bieberich and Morgan (2004) compared children with autism to children with Down syndrome concluded that children with autism have significantly more difficulty in self-regulation. They noted children with autism have more problems in modulation, attention and executive functioning, specifically flexible goal directed behavior. One implication of this study is that it was not carried out in the children's natural environment, possibly inducing more anxiety from children with autism who are prone to being uncomfortable in unfamiliar settings.

To help us find answers on why children with ASD are having difficulty self-regulating, we can go back to the work of Claire Kopp. As pointed out by Kopp (1982), it is during the control phase of her self-regulation developmental continuum, that the child demonstrates an emerging awareness of social and task demands that are set by the caregivers; however, it is widely cited that children on the autism spectrum experience deficits in social cognition (Prizant, Wetherby, Rubin, Laurent and Rydell, 2006). Lacking social cognition will make picking up the social rules and rapid social cues given by others more difficult with children with ASD. As neurotypical children attempt to initiate, maintain, modulate or cease their behavior according to social or task demands, the child with autism may be distracted by something non-relevant in the environment or be focused on a high interest. The delays in social cognition will therefore limit

their ability to notice the effects of their actions and social attempts as well. The child with ASD may not gain the awareness of the caregiver's wants. The guidance the child receives from caregivers helps progress the child into the next phase of the self-regulation continuum, self-control; however, it seems many of the students with ASD continue to have lagging skills that typically develop during the control phase.

Sergeant, Geurts, and Oosterlaan (2002) reviewed selective current research studies on executive functioning in children with ADS, ADHD, as well as other diagnoses. The author's review found strong differences between the diagnostic groups as well as when compared to the controls in the key areas of executive functioning (inhibition, set shifting/flexibility, working memory, planning and fluency). The Wisconsin Card Sorting Test (WCST) measures set shifting or flexibility, by assessing skills in the areas of conceptual problem solving, use of feedback, inhibition and ability to modify incorrect responses as well as requiring working memory. Specifically, the review completed by Sergeant et al. found that both children with autism and ADHD demonstrated deficits in flexibility when compared to the norms; however, children with autism consistently performed poorer than children with ADHD on set shift tasks. The author's review examined the executive functioning task of planning, which is the skill of having foresight to look ahead to a future goal, prepare, and then evaluate and monitor the execution of the steps necessary to achieve the goal. Sergeant et al. also compared studies on planning that used the tower tasks to measure the subjects' abilities to plan, execute, monitor, and revise their sequence of moves. All five studies reviewed by the authors demonstrated significant differences between the participants with high functioning autism and the controls in the function of planning. Two studies examined by the authors specifically compared planning in children with ADHD and autism and the children with autism performed poorer than those

with ADHD and the controls. Sergeant et al. report that on the executive functioning task for fluency, the subjects were given a set of stimulus conditions and were measured if they generated the appropriate response. Fluency requires the following cognitive processes: working memory, semantic memory, inhibition, set maintenance, vocabulary size and processing speed. The authors discovered that three out of three studies measuring fluency using categories found that children with autism's performance differentiated from the controls. Limitations of this research review cited by the authors include the difficulty discerning the different diagnoses from each other and the high rates of comorbidity between the diagnoses. Further research in order to develop an executive functioning impairment profile that is specific to each disorder is called for by the authors.

Given the recommendation of Sergeant et al. (2002) to further distinguish executive function profiles for children with autism and ADHD, Happé, Booth, Charlton and Hughes (2005) designed a study to accomplish this. Happé et al. chose different tests than Sergeant et al. to measure the same key areas of executive function. The research conducted by Happé et al. demonstrated significant impairments in both disorders in executive functioning. The authors found that the clinical group with autism had poorer response selection/monitoring on a cognitive estimates task than the clinical group with ADHD or typically developing children. However, the authors found that children with ASD did not demonstrate greater deficits than those with ADHD in the tasks requiring set shift/flexibility or working memory. This finding contradicts the findings Sergeant et al. reported in their paper as mentioned above. Surprised by the discrepancy in their findings, Happé et al. proposed the differences may be a result of using too small of clinical group sizes to find a significant difference and excluding cases with comorbid symptoms which reduced the severity of clinical groups. Happé et al. did find

different developmental trajectories of executive functioning skills in children with ASD when compared to children with ADHD. The author's research indicated that as children with ASD age (especially those with high-functioning autism); their deficits in executive functioning diminish when compared to typical peers on many executive functioning measures. Happé et al. found this was not the case in the development of children with ADHD, whose deficits remained at the same level of impairment when retested during adolescences.

Significant emotional regulatory difficulties associated with children with autism are well documented (Prizant et at., 2006) and a hallmark feature of autism. Given the rigid, inflexible thinking patterns that are characteristic of people with autism spectrum disorders, many children experience resistance and distress to changes possible resulting in temper tantrums, aggression and self-injurious behavior (DSM-IV, 1994). The DSM IV cites abnormalities of mood or affect as an associated feature of autism.

Noted sensory differences in children with ASD date back to Kanner's and Asperger's original observations (Frith, 1989). Ayres (1979) goes into great depth describing her observations of the sensory problems in children with ASD, including the frequent hypersensitivity to touch, odor and noise, as well as their seeking of deep pressure and vestibular input. The DSM-IV (1994) states that odd responses to sensory stimuli may be present in people with an autistic disorder. Grandin (1995) urges education programs to take into account the students sensory needs and how they may impact the student's behavior.

Simpson and Myles (1998) explain that given the difficulties in self-regulation children with ASD experience, paired with their well documented poor skills in social cognition, provides clarity on why these children can display aggressive behaviors to themselves or others children. In order to assist professionals in the planning and implementing of programs for with students

on the autism spectrum, Myles, Grossman, Aspy, Henry and Coffin (2007) developed the Ziggurat Model. This model stresses the importance of targeting the underlying needs that interfere with appropriate functioning, starting with evaluating the child's sensory differences and biological needs. The authors point out that although these neurological differences, such as anxiety, distractibility, overactivity, and impulsivity, are not part of the criteria for an Autism Spectrum Disorder (ASD) diagnosis; they pose significant challenges to the student. Essentially these authors are describing difficulties in self-regulation and note that if these needs are not addressed, then the effectiveness of all intervention will be lessened.

ADHD and Self-Regulation

Research supports that children diagnosed with attention deficit hyperactive disorder (ADHD) also experience difficulties with self-regulation and if not addressed can lead to aggressive behaviors (Barkley, 1997; Kats-Gold, Besser and Priel, 2007). Barkley (1997) lists children with ADHD are at risk for the following: low academic achievement, poor school performance, retention in a grade, suspension and expulsions, poor peer and family relations, anxiety, depression, aggression, conduct and delinquency problems, early substance experimentation and abuse, driving accidents, and difficulties in adult social relationships and employment. The DSM-IV (1994) cites associated features of ADHD may include poor frustration tolerance, temper outburst, mood lability, rejection by peers, bossiness and stubbornness. Poor self-regulation may be at the root of many of these problems, and if properly addressed, theses risks could be minimized. Barkley cites numerous studies which contribute evidence that suggests that ADHD arises secondary to dysfunctions in the structures of the prefrontal cortex and its networks with other area of the brain. He theorizes and cities

supporting evidence that behavioral inhibition characterizes ADHD and affects the effectiveness of other executive functions.

As cited earlier, Sergeant et al. (2002) found that children with ADHD demonstrated deficits in set shifting and planning, but not at the level of severity as the children with ASD. The author's research review also found that two studies which indicated that children with ADHD demonstrated significant differences when compared to controls on their performance of working memory using the self ordered pointing (SOP) task to measure performance. Working memory involves the ability to not only store information, but also to meaningful manipulate it. In the executive function area of inhibition, Sergeant et al. reviewed a stop task to measure children's ability to stop a motor response that was being performed. The authors review found clear evidence of inhibitory dysfunction in children with ADHD. To also measure inhibition, the author's review compared twelve studies that used the Stroop test. This test requires inhibition and attention, as flash cards are presented with different colors are written on them. Some color words are printed in a color other than then the color they read and the study by Sergeant et al. found deficits in children with ADHD in 10 out of 12 studies. Overall, the research reviewed by Sergeant et al. concluded that executive functioning deficits are not specific to children with ADHD, though different disorders present with different profiles of executive functioning deficits.

Studying 111 boys at risk of ADHD, Kats-Gold et al. (2007) wanted to uncover the underlying deficits that contribute to the poor social skills and behavioral problems that are a cornerstone of ADHD. The authors theorized that deficits extended beyond impaired executive functioning, behavior disinhibition and self-regulation, as these did not fully account for deficits in social skills. Their research found that boys at risk of ADHD not only have difficulty with

recognizing the facial expressions and emotions of others, but also tend to interpret emotions more negatively than others. The study by Kats-Gold et al. demonstrates students at risk for ADHD have needs in emotional regulation and social cognition, similar to children with ASD. Kats-Gold et al. call for interventions that improve the social skills of children with ADHD, specifically in the area of emotion recognition. Emotion recognition and social cognition are skills commonly addressed with ASD population; however, in my experience, these skills are not as frequently targeted with students with EBD, the educational label that students with ADHD commonly fall under in order to receive special educational services. In the study mentioned earlier, Happé, et al. (2005) confirmed Sergeant et al.'s finding of significant deficits in inhibition when compared to other disorders as well as typically developing peers. Contrary to Sergeant et al.'s finding, Happé et al. found the ADHD group to have more deficits in planning and working memory tasks than the ASD group. Though both studies demonstrate deficits in executive functioning with children with ADHD and ASD, it appears necessary to continue to study the patterns of executive functioning in these populations. Looking back to Kopp's (1982) self-regulation development theory, the findings Happé and Sergeant et al.'s report in regards to children with ADHD and executive function transfers to experiencing lagging skills in the self-control phase. The child with ADHD is slower to develop the ability to delay action when requested and behave according to caregiver or social expectations despite the lack of external monitors. Given the delays cited in working memory, compliance and internal self-monitoring may emerge slower. As the neurotypical child begins to demonstrate impulse control, the child with ADHD may struggle with this for years. The difficulty boys with ADHD have with recognizing the facial expressions and emotions of others, as well as their ability to interpret emotions correctly (Kats-Gold et al., 2007) points to lagging skills in the control phase as well.

Given the lagging skills children with ASD and ADHD experience in social skills and executive functioning, producing strategies which reduce tension and increasing self-reflection of their behavior is more difficult. While we are waiting for the research to be more conclusive, as educators, we can be informally assessing what underlying deficits their students have and be working to build the lagging skills.

I see a need to create a curriculum targeting emotional recognition, executive functioning, sensory integration and social cognition for children with neurobiological impairments, as these are fundamental skills in being able to self-regulate. If one can not read how the people around them are feeling, let alone themselves, he or she can not respond appropriately. I see the need to teach the children how to recognize their different states of arousal, whether it is due to sensory needs, emotions and moods, or circumstances around them. The students need to learn how to think before acting and to problem solve better solutions. They need to know what sensory and calming strategies help them regulate their bodies to more appropriate levels of arousal. They need to move from having staff assist them in regulating themselves, to internally self-regulating. In order to teach the students these skills, I need to find the most effective teaching strategies that fit the students' learning styles.

Learning Styles and Best Practices in Teaching for Students with Neurobiological Impairments

With the adoption of the No Child Left Behind Act of 2001, there has been a push for educators to adopt using practices developed from scientifically based research that have met rigorous peer review and standards affirming the practice's positive results (Simpson, 2005). Using effective practices is critical for all students, but certainly for the students who can pose

the hardest challenges for the educational system, whether it's with the increased numbers in special education to the disruptive behavior in the classrooms. Prizant et al. (2006) argue that an education approach needs to address the core developmental challenges of the students, as well as take into account the learning style of the students. The authors argue the learning needs to take place within the students' natural environments in order to help increase student motivation for participation, aid in understanding and ease generalization to learned skills. It is critical that as educators, we are doing everything we can to make students successful, so they can remain in their regular education classrooms and meet their individualized educational goals and objectives.

There are learning styles unique to students with autism that need to be considered when designing the curriculum. Simon Baron-Cohen (2006) theorizes that people with ASD are highly driven to create systems to understand information. They have a difficult time coping with changes in systems, as well as understanding emotions and social concepts that do not lend to lawful systems. I see the need to categorize emotions and levels of arousal to make it easier for a student with ASD to understand and systematize. The resulting system will also provide an easier way for the student to communicate his level of arousal or emotion.

Weak central coherence, a cognitive theory introduced by Frith (1989) was used to explain the tendency for people with autism to be drawn to the details when processing information, rather than processing information for global meaning or "seeing the big picture". Happé and Frith (2006) expand on the theory by clarifying that people with ASD have a processing bias and superiority in local/detail focused processing; however, they often do not connect how the details of the process fit into the bigger picture. This cognitive style characteristic of people with ASD may be partially explained by the executive dysfunctions

characteristic of people with ASD (Happé and Frith, 2006; Sergeant et al., 2002). The difficulties in processing the gestalt information may be due to the deficits in the set shifting from detail/local to global levels of processing, given the person is bias to detail processing. Happé and Frith go on to reason that the problems in working memory might further lend people with ASD to prefer processing smaller bits of information and the limitations in planning may contribute to the disorganization when approaching novel tasks. It appears important that the curriculum I design takes into account the difficulties the children with ASD may have in seeing the big picture of the curriculum, such as how self-regulation can help them improve their daily living.

Given the discrepancy between some people with ASD's ability to solve explicit social cognitive problems and their real life inability to meet the social demands, Ami Klin (2003) developed the Enactive Mind approach. Rather than giving the child a pre-set of rules that govern our social world, Klin argues that there is a plethora of factors that need to be considered depending on the context, the person's motivations, needs and ongoing adjustments. Klin cites the difficulty students with ASD have with generalizing skills to new environments as one of the major limitations of current teaching strategies, and attempts to correct this by teaching children in the naturalistic social situations. Klin reasons that by repeated exposure of naturalistic social situations, children will get practice reading and adapting to the rapid socially salient information they need to curtail their social differences. It is necessary that I design learning activities that reinforces students' application of the material in all areas of their life.

Temple Grandin (1995) authored an autobiographical chapter in *Teaching Children with Autism* (Quill, 1995) on the learning styles of people with autism. Temple Grandin is an adult with autism, an international speaker and author on autism, as well as a successful business

woman in the livestock industry. Temple points out that it is well documented that children with ASD demonstrate strengths in their spatial, perceptual and matching skills, but experience difficulties in verbal tasks that depend on language comprehension and expression. Temple describes her thinking style as seeing information in pictures, rather than words. She relates incoming information into a pictorial representation for future retrieval, where she can replay the information like a movie. She discusses how much easier it is for her to learn if verbal information is translated into visual pictures/words. Given a student with ASD's difficulties shifting attention and difficulty processing auditory information, a verbal message may be over before the student is focused enough to begin processing it. Verbal information is fluid, where as visual information is more salient. Grandin calls on educators to write down instructions so students can frequently refer back to the steps, rather than get lost in long strings of verbal information. Hodgdon's study (as citied in Quill, 1995) strengthens this argument by verifying the correlation of use of visual communication supports to enhance communication and significant reductions in various behaviors. She emphasizes the use of concrete visual supports for students with ASD to help with understanding, recall, attention and prediction of events. Hodgdon states that visuals supports and tools can be used to give information, directions and rules. Visuals help to teach alternative behaviors and lay out options a student has when faced with a situation. As I design a curriculum that takes into account the learning styles of students with ASD, I must ensure that I include numerous visual supports to help students understand the content, as well as assist them in applying the content within their environment.

Grandin (1995) also calls for educators to provide a structured, predictable classroom environment in order to lessen students' anxiety and level of arousal. Structured Teaching is a widely used method of working with students with ASD. Commonly referred to as TEACCH,

Structured Teaching focuses on increasing students' skills by making the environment more comprehensible to the students' needs (Mesibov, Shea, and Schopler, 2004). Mesibov et al. explains that Structured Teaching is based upon research findings that students in structured teaching settings demonstrate more on-task behavior and achieve higher academic scores; as well as the numerous clinical research findings that people with ASD learn and function more effectively with the support of visuals. The authors go on to clarify that Structured Teaching emphasizes the importance of having a predictable sequence of activities for students with ASD so that they have better understanding of their environment and expectations. The authors also stressed the importance of providing visual schedules that students can easily comprehend and access. Visual schedules are warranted to ease transitions that are often difficult for students with ASD, as well as lesson the prompting from adults. I see the need to incorporate predictability and structure into the curriculum I design.

Miranda, Presentación and Soriano (2002) conducted a study to evaluate the effectiveness of a multi-component program aimed at treating the self-regulatory deficits in students with ADHD. Through a series of eight three-hour training sessions, teachers were educated on the nature of the disorder; behavior modification techniques (such a positive reinforcement, token systems, and time-outs); and cognitive behavior strategies (self-instruction, self-evaluation using a set criterion of the basic classroom rules, and self-talk). The results by Miranda et al. indicate that the students' whose teachers applied the set of techniques received in training demonstrated a reduction in hyperactivity and impulsive behavior, antisocial behavior, anxiety and a significant increase in self-control. The researchers found that as the self-regulation abilities increased in the students, so did their academic performance in math and natural science. The researchers also found improved teachers' knowledge on instructional strategies to meet their

students' educational needs. The researches note that a limitation of the study is the lack of retesting to see if the improvements seen using the cognitive behavior interventions maintained over time. The Miranda et al. also point out that given the biological basis of ADHD, the best treatment includes a combination of pharmacological and psychosocial modalities that are maintained over time, along with classroom interventions and parent training.

Lee, Simpson, and Shogren (2007) also studied the effects of cognitive behavior management, or as they refer to it as self-management, in students with ASD. The authors describe self-management to include self-monitoring, self-assessment, self-observation, self-recording, self-evaluation, self-instruction and self-reinforcement. These cognitive behavior management techniques give students control of their behavior, rather than relying on external regulators. Students gain insight on how they think, feel, and act, as well as how their behavior affects others through cognitive behavior management programs (Swaggart, 1998). The study Lee et al. found that self-management strategies have proven scientifically effective in improving the social skills in students with autism and should be given consideration when programming for. Implications of the study by Lee et al. include a lack of research in the effectiveness in using self-management techniques with younger students and the effectiveness of using self-management techniques in teaching other skills.

Also evaluating the effectiveness of a cognitive behavior management approach, Sofronoff, Attwood and Hinton (2005) used cognitive behavior therapy as an intervention for anxiety in children diagnosed with Asperger's syndrome. Children with autism and especially those on the higher end of the spectrum are more prone to experience elevated levels of anxiety. The authors note that when children with ASD is experiencing anxiety or mood problems, they are more likely to display aggressive behaviors, have poorer peer and teacher relations, and

demand more from their parents. In order to help these children learn to self-regulate their anxiety, Sofronoff et al. divided the children into three intervention groups: group one where only the children received the cognitive behavior therapy, group two where the children and parents received the intervention, and group three which was a control group. The six two-hour interventions created by the researchers explored: emotions and how to recognize them; created a "tool box" that included a variety of "tools" to help "fix the feeling"; addressed distorted thinking; examined the range of emotions with the concept of a 'thermometer'; involved group discussions where the participants could share strategies; and devised personal programs for each participant. The study by Sofronoff et al. found that by providing a highly structured, informative and entertaining program using a cognitive behavior management model, the children in group one and two were reported to have a reduction in anxiety symptoms, fewer social worries, and able to cite a significant increase in coping strategies for an anxiety provoking situation. The researches' results indicated that group two demonstrated more significant benefits for both children and parents than group one and the control group. In the study by Sofronoff et al., parents reported that they noticed their child not getting stressed as quickly and recovering faster, especially when the parents encouraged the use of the strategies. Implications of the study by Sofronoff et al. include relying on data collection that was heavily weighted on parent-report and the authors call for future research to include data collection from multiple sources. Limitations of using a cognitive behavior management approach, according to Swaggart (1998) include that it is more difficult to use with students who have decreased language for self-instruction, as well as for students who can't complete activities independently.

Riccomini, Zhang and Katsiyannis (2005) conducted a meta-analysis of studies to find promising school based interventions to reduce aggression and dropout rates in students with

behavioral disorders, ADHD and learning disabilities. Their synthesis of research concludes that the best approaches not only focus on reducing aggressive behavior, but also on increasing appropriate social behavior. The following teaching strategies are cited by Riccomini et al. as have been researched and statistically proven to significant curb aggressive behaviors. They concluded using a cognitive behavior management program which includes teaching students to use self-instructions to stop, think and problem solve before they act, as well as the use of videotaping targeted behaviors, analysis, role playing and practice with and without supervision is effective in increasing self-control (self-regulation). The authors point to the use of training alternative social responses in order to learn social skills through video-modeling that can used to replace aggressive behaviors. According to the authors, teacher praise/reinforcement has been found to be effective when given to positively reinforce desired appropriate social behavior. Riccomini et al. also recommend using Positive Behavior Supports (PBS) to prevent problem behaviors and achieve the necessary social and academic goals.

Summary

I was rewarded to find vast amounts of information on my topics of research; however, this presented the challenge of narrowing it down to the most pertinent information needed to answer my question. Through review of the literature, I have established a deeper understanding of the multifaceted components of self-regulation and the profound impact it has on a child's success. The literature review started by exploring typical development of self-regulation from infancy through adolescence as well as the neurological processes involved. The literature showed that efficient self-regulation is dependent on the components of executive functioning, emotional regulation, and sensory integration. Each of these components was delved into and it

was discovered how it is necessary that they interrelate in order to efficiently self-regulate. The neurobiological based disorders of autism and attention deficit hyperactive disorder were discussed secondary to their deficits in self-regulation. Finally, learning styles and effective teaching strategies for students with neurobiological impairments were investigated through the literature review. What is hopeful is that there are several strategies that have been found effective or promising in helping these students gain skills in self-regulation. What is missing is a curriculum that takes into account the learning styles and incorporates the teaching strategies into one easy to use tool that teachers can use to teach self-regulation to their students.

In Chapter Three, I will explore how to design a curriculum using the curriculum design model *Understanding by Design*. I will look at integrating the concept of The Zones of Regulation into a curriculum to get me closer to answering the question, *how do I develop a curriculum to teach students with neurobiological impairments to self-regulate?*

BIBLIOGRAPHY

American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders (4th ed.)*. Washington, DC: Author.

Amaral, D. (2008, May). *An overview of current research on autism spectrum disorders.* Lecture presented at the Minnesota Autism Symposium, Minneapolis, MN.

Ayres, A. J. (1972). *Sensory integration and learning disorders.* Los Angeles, CA: Western Psychological Services.

Ayres, A. J. (1979). *Sensory integration and the child*. Los Angeles, CA: Western Psychological Services.

Barkley, R. A. (1997). Behavioral inhibition, sustained attention, and executive functions: Constructing a unifying theory of ADHD. *Psychological Bulletin, 121*(1), 65-94.

Baron-Cohen, S. (2006). The hyper-systemizing, assortative mating theory of autism. *Progress in Neuro-Psychopharmacology & Biological Psychiatry, 30*(5), 865-872.

Bieberich, A. A., & Morgan, S. B. (2004). Self-regulation and affective expression during play in children with autism or down syndrome: A short-term longitudinal study. *Journal of Autism and Developmental Disorders, 34*(4), 439-448.

Bronson, M. (2000). *Self-regulation in early childhood*. New York: The Guilford Press.

Buron, K. D. (2006). *When my worries get too big! : A relaxation book for children who live with anxiety.* Shawnee Mission, KS: Autism Asperger Publishing Co.

Buron, K. D., & Curtis, M. (2003). *The incredible 5-point scale*. Shawnee Mission, KS: Autism Asperger Publishing Co.

Byers, R. (1999). Experience and achievement: Initiatives in curriculum development for pupils with severe and profound and multiple learning difficulties. *British Journal of Special Education, 26*(4), 184-188.

Cain, J. (2000). *The way I feel*. Seattle, WA: Parenting Press, Inc.

Degangi, G. A., Breinbauer, C., Roosevelt, J. D., Porges, S., & Greenspan, S. (2000). Prediction of childhood problems at three years in children experiencing disorders of regulation during infancy. *Infant Mental Health Journal, 21*(3), 156-175.

Department of Children Families & Learning. (2001). *Integrating Minnesota graduation standards and special education: A framework*. Roseville, MN: Author.

Dodge, K. A. (1989). Coordinating responses to aversive stimuli: Introduction to a special section on the development of emotion regulation. *Developmental Psychology, 25*(3), 339-342.

Egger, H. L., & Angold, A. (2006). Common emotional and behavioral disorders in preschool children: Presentation, neurology, and epidemiology. *Journal of Child Psychology & Psychiatry, 47*(3), 313-337.

Fisher, N., & Happé, F. (2005). A training study of theory of mind and executive function in children with autistic spectrum disorders. *Journal of Autism and Developmental Disorders, 35*(6), 757-771.

Gomez, C. R., & Baird, S. (2005). Identifying early indicators for autism in self-regulation difficulties. *Focus on Autism and Other Developmental Disabilities, 20*(2), 106-116.

Grandin, T., & Scariano, M. (1986). *Emergence: Labeled autistic*. New York: Warner Books.

Green, J. (2004). *I have feelings, too! An interactive reading book of emotions for teens, adults and seniors.* Santa Clarita, CA: Greenhouse Publications.

Greene, R. W. (2005). *The explosive child*. New York, NY: HarperCollins Publishers.

Greene, R. W., & Ablon, J. S. (2006). *Treating explosive kids: The collaborative problem-solving approach*. New York, NY: The Guilford Press.

Greene, R. W. (. (1998). *The explosive child: A new approach for understanding and parenting easily frustrated, "chronically inflexible" children*. New York, NY, US: HarperCollins Publishers.

Greene, R. W., Ablon, J. S., Goring, J. C., Raezer-Blakely, L., Markey, J., Monuteaux, M. C., et al. (2004). Effectiveness of collaborative problem solving in affectively dysregulated children with oppositional-defiant disorder: Initial findings. *Journal of Consulting and Clinical Psychology, 72*(6), 1157-1164.

Greene, R. W., Ablon, J. S., Hassuk, B., Regan, K. M., & Martin, A. (2007). "Use of collaborative problem solving to reduce seclusion and restraint in child and adolescent inpatient units": Correction. *Psychiatric Services, 58*(8), 1040.

Greene, R. W., Ablon, J. S., & Martin, A. (2006). Use of collaborative problem solving to reduce seclusion and restraint in child and adolescent inpatient units. *Psychiatric Services, 57*(5), 610-612.

Greene, R. W., Biederman, J., Faraone, S. V., Sienna, M., & Garcia-Jetton, J. (1997). Adolescent outcome of boys with attention-deficit/hyperactivity disorder and social disability: Results

from a 4-year longitudinal follow-up study. *Journal of Consulting and Clinical Psychology, 65*(5), 758-767.

Happé, F. (1994). *Autism: An introduction to psychological theory*. Cambridge, MA, US: Harvard University Press.

Happé, F., Booth, R., Charlton, R., & Hughes, C. (2006). Executive function deficits in autism spectrum disorders and attention-deficit/hyperactivity disorder: Examining profiles across domains and ages. *Brain and Cognition, 61*(1), 25-39.

Happé, F., & Frith, U. (2006). The weak coherence account: Detail-focused cognitive style in autism spectrum disorders. *Journal of Autism and Developmental Disorders, 36*(1), 5-25.

Harris, C. R., Kaff, M. S., Anderson, M. J., & Knackendoffel, A. (2007). Designing flexible instruction. *Principal Leadership, 7*(9), 31-35.

Henderson, H. A., & Wachs, T. D. (2007). Temperament theory and the study of cognition-emotion interactions across development. *Developmental Review, 27*(3), 396-427.

Janzen, J. E. (2003). *Understanding the nature of autism: A guide to the autism spectrum disorders* (2nd ed.). San Antonio, TX: Harcourt Assessment, Inc..

Kachenmeister, C. (1989). *On Monday when it rained*. Boston: Houghton Mifflin Company.

Kats-Gold, I., Besser, A., & Priel, B. (2007). The role of simple emotion recognition skills among school aged boys at risk of ADHD. *Journal of Abnormal Child Psychology, 35*(3), 363-378.

Kopp, C. B. (1982). Antecedents of self-regulation: A developmental perspective. *Developmental Psychology, 18*(2), 199-214.

Lee, S., Simpson, R. L., & Shogren, K. A. (2007). Effects and implications of self-management for students with autism: A meta-analysis. *Focus on Autism and Other Developmental Disabilities, 22*(1), 2-13.

Lewis, M. D., & Todd, R. M. (2007). The self-regulating brain: Cortical-subcortical feedback and the development of intelligent action. *Cognitive Development, 22*(4), 406-430.

Liebermann, D., Giesbrecht, G. F., & Muller, U. (2007). Cognitive and emotional aspects of self-regulation in preschoolers. *Cognitive Development, 22*(4), 511-529.

Lloyd, J. W., Forness, S. R., & Kavale, K. A. (1998). Some methods are more effective than others. *Intervention in School and Clinic, 33*(4), 195-200.

Loth, E., Gómez, J. C., & Happé, F. (2008). Event schemas in autism spectrum disorders: The role of theory of mind and weak central coherence. *Journal of Autism and Developmental Disorders, 38*(3), 449-463.

Marks, S., Hudson, J., Schrader, C., Longaker, T., & Levin, M. (2006). Reconsidering behavior management for students with autism spectrum disorders. *Beyond Behavior, Winter.*

McTighe, J., & Wiggins, G. (2004). *Understanding by design: Professional development workbook*. Alexandria, VA: Association for Supervision and Curriculum Development.

McTighe, J., & Wiggins, G. (2005). *Understanding by design: Expanded 2nd ed.* Alexandria, VA: Association for Supervison and Curriculum Development.

Mesibov, G. B., Shea, V., & Schopler, E. (2004). *The TEACCH approach to autism spectrum disorders*. New York: Springer Science+Business Media, LLC.

Minnesota Department of Education. (2008, September 22). *Minnesota academic standards: Mathematics k-12 (2007 version).* Retrieved October 3, 2008, from http://education.state.mn.us/MDE/Academic_Excellence/Academic_Standards/index.html

Minnesota Department of Education. (2003, May 19). *Minnesota academic standards: Language arts k-12.* Retrieved October 3, 2008, from http://education.state.mn.us/MDE/Academic_Excellence/Academic_Standards/index.html

Miranda, A., Presentación, M. J., & Soriano, M. (2002). Effectiveness of a school-based multicomponent program for the treatment of children with ADHD. *Journal of Learning Disabilities, 35*(6; 6), 546.

Murray-Slutsky, C., & Paris, B. A. (2000). *Exploring the spectrum of autism and pervasive developmental disorders: Intervention strategies*. Austin, TX: Hammill Institute On Disabilities.

Myles, B. S., Cook, K. T., Miller, N. E., Rinner, L., & Robbins, L. A. (2000). *Asperger syndrome and sensory issues*. Shawnee Mission, KS: Autism Asperger Publishing Co.

Myles, B. S., Grossman, B. G., Aspy, R., Henry, S. A., & Coffin, A. B. (2007). Planning a comprehensive program for students with autism spectrum disorders using evidence-based practices. *Education & Training in Developmental Disabilities, 42*(4), 398-409.

Office of Revisor Statutes, State of Minnesota. (2007). *Minnesota statutes 2007: Chapter 120B: Curriculum And Assessment*. Retrieved October 3, 2008, from https://www.revisor.leg.state.mn.us/bin/getpub.php?pubtype=STAT_CHAP&year=2007&section=120B

Oetter, P., Richter, E. W., & Frick, S. M. (1993). *M.O.R.E.: Integrating the mouth with sensory and postural functions* (First Complete Edition ed.). Hugo, MN: PDP Press, Inc.

Prizant, B. M., Wetherby, A. M., Rubin, E., Laurent, A. C., & Rydell, P. J. (2006). *The SCERTS model: A comprehensive educational approach for children with autism spectrum disorders (Volume 1: Assessment)*. Baltimore, MD: Paul H. Brookes Publishing Co.

Quill, K. (Ed.). (1995). *Teaching children with autism: Strategies to enhance communication and socialization*. Albany, NY: Delmar.

Riccomini, P. J., Zhang, D., & Katsiyannis, A. (2005). Promising school-based interventions for reducing aggressive behavior and student dropout. *The Journal of at-Risk Issues, 11*(2), 11-16.

Sergeant, J. A., Geurts, H., & Oosterlaan, J. (2002). How specific is a deficit of executive functioning for attention-deficit/hyperactivity disorder? *Behavioural Brain Research.Special Issue: Neurobehavioural Mechanisms in ADHD, 130*(1-2), 3-28.

Simonds, J., Kieras, J. E., Rueda, M. R., & Rothbart, M. K. (2007). Effortful control, executive attention, and emotional regulation in 7-10-year-old children. *Cognitive Development, 22*(4), 474-488.

Simpson, R. L. (2005). Evidence-based practices and students with autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities, 20*(3), 140.

Simpson, R. L., & Myles, B. S. (1998). Aggression among children and youth who have Asperger's syndrome: A different population requiring different strategies. *Preventing School Failure, 42*(4), 149-153.

Sofronoff, K., Attwood, T., & Hinton, S. (2005). A randomized controlled trial of a CBT intervention for anxiety in children with Asperger syndrome. *The Journal of Child Psychology and Psychiatry and Allied Disciplines, 46*(11), 1152-1160.

Sofronoff, K., Attwood, T., Hinton, S., & Levin, I. (2007). A randomized controlled trial of a cognitive behavioural intervention for anger management in children diagnosed with Asperger syndrome. *Journal of Autism and Developmental Disorders, 37*(7), 1203-1214.

Swaggart, B. L. (1998). Implementing a cognitive behavior management program. *Intervention in School and Clinic, 33*(4), 235-238.

Williams, M. S., & Shellenberger, S. (1994). *"How does your engine run?" A leader's guide to the alert program for self-regulation.* Albuquerque, NM: TherapyWorks, Inc.

Zero to Three. (1994). *Diagnostic classification of mental health and developmental disorders of infancy and early childhood.* Arlington, VA: National Center for Clinical Infant Programs.