Sensory Integration: Exploring the Benefits for Students with Autism at the Secondary Level

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Abstract

Without glaring signs or signals of sensory diagnoses, sensory deficits pose a significant challenge for students and for teachers. Historically, medical doctors have lacked a well-developed understanding of sensory integrative disorders, which makes them more difficult to diagnose at a young age. Sensory integration is an excellent way to mitigate sensory overload to best meet the needs of learners with sensory deficits. The purpose of this qualitative descriptive case study was to understand the experiences of secondary general educators with respect to sensory integration in the inclusion secondary classroom; specifically, how general education secondary teachers integrate sensory experiences into the curriculum for students with Autism Spectrum Disorder (ASD) or High Functioning Autism (HFA) and how teachers describe the benefits of Sensory Integration (SI) for students with Autism Spectrum Disorder ASD or High Functioning Autism (HFA) in relationship to classroom behavior, social experiences and academic performance in the classroom. The research took place at a public high school in the Mid-Atlantic in the U.S. Study participants included educators diverse in age, gender, ethnicity, content, and teaching experience. A qualitative case study was used to interpret the true meaning and understanding of teacher and student interaction involving sensory integration. The results of this study found teachers integrated sensory integration techniques categorized as: Academic, Academic/Personal, Sensory, Awareness, Interaction, and Behavior with a preference for self-regulation and organization strategies. A recommendation for practice include teachers at the secondary level receiving training on how to use, implement, and understand sensory integration to reach all learners successfully.

Key words: sensory integration, secondary educators, autism, public high school, learning strategies
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Chapter 1: Introduction

Autism Spectrum Disorder (ASD) and sensory integration may seem like separate endeavors; however, both are inextricably linked together in order to understand and foster learning in the inclusive environment. High functioning autistic (HFA) students make up a significant portion of ASD population included into general education classrooms throughout education. These particular students exhibit similar sensory needs as non-verbal or low functioning autistic students. All learners receive information differently, especially students with HFA. Students with HFA have different learning profiles than their general education counterparts and often need a sensory based curriculum or approach to find success academically, socially, and emotionally.

Rudy (2017) states that students with an IQ of 70 or higher fit into the high functioning population of ASD. As with all spectrum disorders, HFA students represent a diverse population with varying abilities and needs. Many people with HFA are intelligent and accomplished but suffer from severe anxiety or sensory dysfunction that often impacts them significantly (Rudy, 2017) and typically within an educational or highly structured environment. This seems to manifest in working memory, which directly impacts learning.

Baddeley (2001) categorizes working memory into three components: executive control, selection of information, process and meaning, and transferring short-term memory to long-term memory. Sensory memory that transfers into working memory will last about 15-20 seconds with a capacity of 5-9 pieces of chunked information. This information learned is maintained in working memory through maintenance or repetitive rehearsal. Most importantly, teachers need to understand the varying levels of individual cognitive load, in other words, the mental effort that
can be engaged in a given moment due to individual characteristics and intellectual capacities, with their students.

Once information is processed into the short-term memory, it is ideal to transfer to long-term memory, which has unlimited space. Long-term memory involves various types of information: declarative (semantic and episodic), procedural (how to do something), and imagery (mental images) (Bransford, 1979). The degree in which individuals process and access information will determine their ability to adequately retrieve and utilize information (Bransford, 1979). In general, we remember a lot less information that is actually stored. Consequently, teachers need to provide appropriately measured sensory accommodations to enhance memory.

The purpose of this descriptive case study was to understand the experiences of secondary general educators with sensory integration in the inclusion secondary classroom. The focus was on teaching students with HFA and ASD at a public high school in the USA in a Mid-Atlantic state. In the research study, sensory integration was generally be defined by A. Jean Ayres, a founder of sensory integration, as “the organization of sensations for use that give us information about physical conditions of our body and the environment around us” (Ayres 1979; 2005) and defined by a team of occupational therapists as “a planned and scheduled activity program to meet a child’s specific sensory needs” (Yack & Colleagues, 2002). Both of these definitions will be interchangeably applied throughout this study along with the terms ASD and HFA. Knowledge generated is expected to inform general and special educators along with administrators at the secondary level.

Statement of the Problem

Medical concerns such as measles, broken bones, or chicken pox are obvious problems that are usually tended to immediately. Without glaring signs or signals of sensory diagnoses,
students with sensory deficits pose as a significant challenge to teachers. Ayres (1972; 2005) believed that inadequate sensory integration is the root cause of delayed learning and/or poor behavior in students with ASD. For example, students with autism possessing academic acuity yet poor behavior, as well as students with autism who experience difficulty self-regulating, dot the landscape of teacher and parent frustration. A lack of situation specific sensory integration augments the adverse behaviors (Schaaf, Hunt, & Benevides; 2012) and thus, increases frustration for all.

Ayres (2005) stated physicians that without severe manifestations teachers and parents will often overlook sensory needs. Moreover, without a proper understanding of sensory integration, even identified sensory integrative dysfunctions, may receive a poor sensory diet that is “a planned and scheduled activity program to meet a child’s specific sensory needs” (Yack & Colleagues, 2002). This may allow schools to potentially segregate students under the auspices of “least restrictive” amidst parent and student complaints. Historically, medical doctors such as pediatricians, family doctors, psychiatrists, or lack a well-developed understanding of sensory integrative disorders, which makes it more difficult to catch at a young age. Ayres (2005) defined sensory integration on a more descriptive level as:

(SI is) the organization of sensations for use. Our senses give us information about physical conditions of our body and the environment around us. Sensations flow into the brain like streams flowing into a lake. Countless bits of sensory information enter our brain at every moment, not only from our eyes and ears but from every place in our body. We have a special sense that detects the pull of gravity and the movements of our body in relation to the earth (p. 5)
Sensory integration is an excellent way to fulfill the deficits, or mitigate the sensory overload of the student. Although there is rich data and promising results with sensory integration in primary education, there still exists a great need to explore sensory diets and integration within the secondary curriculum and inclusive environment. Students who have not been exposed to a sensory diet or curriculum on a consistent basis throughout their elementary years do not realize what they need, how to advocate, or self-regulate at the secondary level.

There remain copious research studies in special education and occupational therapy fields to bolster sensory integration and education (Ayres, 1991) in the primary or elementary community. Furthermore, the fields of occupational therapy and psychology offer significant studies focusing on the intersection of autism and sensory needs. However, there is very little research supporting sensory integration, sensory knowledge, or sensory understanding within the curriculum and inclusive classroom at the secondary level for students with HFA.

Policy research, which includes the Common Core Standards, Every Student Succeeds Act (ESSA), Maryland State Policy with special education, and IDEA, includes statements claiming the success of their policies in reaching the needs of all learners, but do not provide usable tools or a roadmap to help teachers and students within the inclusive classroom setting. Common Core’s website explores reasons why Common Core is the best way to educate all children and how it prepares students to become career and college ready. This begs the question; do they include special education students into the “all” category? Special educators find many difficulties in aligning grade appropriate Individualized Education Program (IEP) goals based on Common Core with students who are functioning well below grade level.
Significance of the Research Question

It is critical that teachers receive the proper training in SI and understand the needs of students with sensory deficits. As well, it is important to educate the community about the benefits of sensory integration within the inclusive model. This study is significant in that it targets the team of professionals supporting students with ASD and HFA that have sensory deficits within the classroom. This phenomenon impacts general and special educators as well as building administrators. When thinking big picture, it is illusive this is a systemic concern requiring exploration at the global, state, local, and individual level.

**General educators.** Educators represent one of the two most significant stakeholders in education. Secondary general educators are typically experts in their specific content. Depending on the teacher preparatory programs attended, multiple intelligence or various sensory approaches may not have been a part of the teaching pedagogy. To best enhance continued professional development in and outside of the school, general educators can co-plan with special educators, attend special education or occupational therapy professional development sessions that can best address engaging learners in various ways through a sensory perspective. When co-planning and cross professional development happen frequently, the groundwork is being done between general and special educator to best serve the needs of students in the classroom.

**Special educators.** Although special educators experience a different approach in their teacher preparatory coursework, every university or college approaches the special education pedagogy differently. Brownell, Ross, Colon, & McCullem (2005) state,

...research in special education teacher education is almost nonexistent. If we are to respond to policy makers’ scathing criticisms of teacher education and their pressure to
increase alternative routes to the classroom, we need research that demonstrates how teacher education makes a difference in securing highly qualified special education teachers. (p. 248-249).

It can be inferred that this data confirms there is more research supporting teacher preparatory programs geared for more highly qualified general educators where there is little evidence on what qualifies a “highly qualified” special educator.

Morgan (2006) claims there is little information about teacher preparatory programs in the special education field. This leaves gaps in teacher preparation that play out in real time within already busy classrooms where students with significant sensory needs struggle to learn as a general education student. Special education teachers work closely with students who have sensory needs without adequate knowledge of how to implement sensory integration. Therefore, the importance of special and general educators thoughtfully applying the co-teaching model for students is critical for various learning styles including sensory integrated techniques in the public-school environment.

Administrators. Principals are the gatekeepers of schools. They set the direction and morale of the building while acting as a liaison to the community. Not only should principals keep a pulse on the building’s professional, social, and academic climate, they also function as the instructional leaders and a source of pedagogic knowledge. Inclusion has a poor chance of success if the principal is not knowledgeable concerning educational needs of all children (Cline, 1981). Unless administrators have a special education background, chances are they know little about the intersection of students with sensory needs and instruction. Unfortunately, even with a special education background, they may be poorly versed in the efficacy of sensory integration.
One of a principal’s most important functions is to hire staff based on student population and in service to the needs of all learners. Understanding a specific teacher’s philosophy and how they fit the culture of the school is valuable. Further, thoughtfully pairing general and special educators together as a co-teaching team is paramount to student learning. Consequently, it makes sense that administrators understand the basics of sensory integration and implement this knowledge to effectively support students and staff. The administrator, special educator, and general educator play a significant role in leveraging a quality-learning environment for all students and thus a primary focus of this study.

**Students.** Students represent the other significant stakeholder. Students with HFA, ASD, and sensory needs may not possess enough self-knowledge to understand their learning needs. Additionally, the teaching approach itself may limit or even occlude sensory needs and self-awareness in the inclusive classroom. This can be problematic and can augment difficulties with respect to time on task thus increasing behavioral issues.

**Support staff.** Although paraprofessionals do not hold teacher certifications, they too play an important role through direct contact with students. The job title as described in section 14B of IDEA (Individual with Disability Education Act) 2004: “Paraprofessionals… who are appropriately trained and supervised, in accordance with State law, regulations, or written policy … are to be used to assist in the provision of special education and related services … to children with disabilities” (20 U.S.C. 1412). This means that paraprofessionals are hired to support special education services for children with disabilities (Causton-Theoharis, 2009); however, IDEA neglects to specify what constitutes appropriate training. Paraprofessionals and Student Assistants often have the most direct contact with students who require sensory integration, yet lack the most knowledge about sensory needs. This often leaves all parties frustrated and relying
on more traditional support mechanisms that make the situation worse. Furthermore, there is little to no accountability for support staff. Training cannot only vary between states and counties, but between buildings and grades.

**Local importance.** The community is also a stakeholder. The local board of education reviewed the Special Education policy in 2014. After allocating a significant amount of money to a private consulting firm to evaluate the existing policy, the county only released 26 pages of the final report. Neighboring districts released hundreds of pages of reporting similar processes, which left this locality feeling deceived and lacking the whole picture of what they found (Baltimore Sun, 2016). This presents a negative trickle-down effect for the administrators, educators, community, and students when communication is censored. This has caused the perception that funding for special education programs and materials may have been reallocated for other uses. Perhaps with a greater understanding of the benefits of sensory integration, funding could go towards professional development and materials designed to support sensory integration for teachers.

**State importance.** Levinson, Sutton, and Winstead (2009) reveal how policy can be spontaneously or informally developed outside of agencies or offices that are continually charged with creating policy. Policy can also be documented, codified, or exist in an unwritten form. In the same token, after researching Maryland State Policy with Special Education, and Individuals with Disabilities Education Act (IDEA), it became evident the theme was to include “all students” or “ensure success for every child”, but finding a solution or a definitive answer behind the policies became a challenge. The overall objective seems to attempt to mold behaviors with a carrot and stick approach. The county involved with the study promotes the inclusive classroom and has a large special education department that explicitly states at professional development
and new teacher orientations that there are significant funds dispersed to special education
departments to enhance the co-teaching model within the inclusive classroom. Maryland State
Department of Education states:

“There is also evidence that inclusive settings can expand a student's personal interests
and knowledge of the world, which is excellent preparation for adulthood. The positive
effects of inclusive education on classmates without disabilities have been well
documented. Both research and anecdotal data have shown that typical learners have
demonstrated a greater acceptance and valuing of individual differences, enhanced self-
esteem, a genuine capacity for friendship, and the acquisition of new skills. Low-
achieving students also benefited from the review, practice, clarity, and feedback
provided to students with disabilities. When inclusive education is implemented
appropriately, all students benefit.” (MSDE, 2016).

While the funds and materials are readily available for new technology and other
initiatives, carry over to the classroom may not happen. Many teachers get laptops and iPads for
inclusive supports, but end up using them for personal use. The educational supports are not
always utilized for their intended purpose. With adequate sensory integration knowledge, these
technological supports can be used more appropriately to address sensory needs of the students.
Furthermore, a better understanding of sensory integration may lead to smarter and more
effective use of funds.

**Global importance.** Perez (2009) argues the policy makers and reformers are the ones
legally responsible and do not take into account the various schools in such unique contexts.
What is troublesome is how most curriculum writers have not devoted time in the classroom to
understand what should be achieved, yet, they believe in local control and policymakers to make
school decisions. This makes it difficult to change the mindset, but perhaps enriched research literature grounded in actual recent classroom experience can start to shift the thinking at a policy level, especially in regards to sensory integration. The Common Core website has a document titled, “Application to Students with Disabilities” which reads:

Students with disabilities are a heterogeneous group with one common characteristic: the presence of disabling conditions that significantly hinder their abilities to benefit from general education (IDEA 34 CFR §300.39, 2004). Therefore, how these high standards are taught and assessed is of the utmost importance in reaching this diverse group of students.

The emphasis on “how” leaves room for interpretation and more research opportunities for teachers is needed to explore within state standards how to align a student’s Individualized Education Program (IEP) with the Common Core standards.

Teachers should be more aware of policy at all levels in order to inform their local practices. Perez (2009) cautions “as educators we have to keep in mind that the impetus, planning, and budgetary support for the subject-centered and test driven curriculum revision comes from outside state and local school districts” (p. 8). Teachers who do not scrutinize and question the policy makers on a higher level are doing themselves and their sensory deficient students a disservice.

**Purpose of the Study**

The purpose of this study was to understand the experiences of secondary general educators who teach students with ASD or HFA at the public middle school level using the curriculum provided. This research was guided by the following questions:
Research Questions

1. How do general education secondary teachers integrate sensory experiences into the curriculum for students with Autism Spectrum Disorder (ASD) or High Functioning Autism (HFA)?

2. How do teachers describe the benefits of Sensory Integration (SI) for students with Autism Spectrum Disorder ASD or High Functioning Autism (HFA) in relationship to classroom behavior, social experiences and academic performance in the classroom?

Definition of Key Terminology

- **Autism Spectrum Disorder (ASD)** - A group of developmental disorders characterized by social impairment, verbal and nonverbal communication difficulties, restricted interests, and repetitive and stereotypical behaviors (American Psychiatric Association, 2000).

- **Sensory Integration (SI)** - A planned and scheduled activity program to meet a child’s specific sensory needs (Yack & Colleagues, 2002).

- **High Functioning Autism (HFA)** - Students with an IQ of 70 or greater who display characteristics of ASD (Rudy, 2017).

- **Occupational Therapist (OT)** - treat injured, ill, or disabled patients through the therapeutic use of everyday activities

- **Speech Language Pathologist (SLP)** - Diagnose and treat individuals who suffer from stutters, as well as vocal and cognitive communication impairments. They also help those whose speech is affected by emotional issues, various learning disabilities and physical impairments, such as a cleft palate.
The following section of this chapter includes a description and discussion of Sensory Integration Theory that served as a theoretical lens for this study.

**Theoretical Framework**

This section is broken into various sections and subsections to facilitate an understanding of how sensory integration is understood and was applied to this study. The first section delves into the developmental stages of sensory integration specifically highlighting the critical ages from birth to seven. The first subsection breaks down the important periods within each developmental stage. This is presented in chart form for visual ease of the reader. The next subsection explains the breakdown of how the brain processes sensory information. The third subsection explores the confluence of ASD and sensory processing. The second section touches on criticism of sensory integration theory from three different perspectives: Occupational Therapists, Special Educators, and Speech Language Pathologists. The last section explains the rational and application of the theory to the study.

**The developmental stages of sensory integration.** Ayres (1979, 2005) described the critical nature of the first seven years in a child’s sensory integration. Children who receive significant sensory integration within their environment for the first seven years of their lives, exhibit minimal negative behaviors in school and can improve social interactions. Ayres (2005) believes that organization through adaptive responses is vital to a child’s development. Adaptive response to sensation is a part of the sensorimotor piece to a child’s early development. This is how a person responds to their body within their environment in creative and useful ways. For example, if we hear something we will turn our heads towards that sound or if we bump into something we will shift our weight to regain balance.
All of these adaptive responses are a part of the sensory integrative approach to navigating the world at birth. Within children there is an inner drive that allows them to develop their own sensory integration. In other words, when a child starts walking and falls down, they are using their adaptive responses and will get up and try again countless times until walking is mastered. The following stages are paramount to a child’s foundational sensory development and these stages will be further explored in chapter two. The stages are:

- **Month one**: Touch, Gravity & movement, Muscle & joint movement, Sight, Sound, Smell and Taste
- **Second and third months**: Eyes & neck, Rising up, Grasping
- **Fourth and sixth months**: Arms & hands, Airplane position, The joy of being moved
- **Sixth & eighth months**: Locomotion, Spatial perception, The fingers & eyes, Motor planning, Babbling
- **Ninth & Twelfth months**: Play, Stand up, Words
- **Second year**: Localization of touch, Moving, Mapping the body, Climbing, Selfhood
- **Third and seventh years**: Using Tools

These years are critical for sensory integration. Nature intended this to be a time when the brain is most receptive to sensation and able to organize all of the sensory experiences occurring within the environment stage by stage. As a child’s inner drive becomes fine-tuned and complex, a child’s adaptive response expands with the child’s capacity for sensory integration. Using tools is an essential part of the sensory integrative process as well. The usage of an individual tool requires sensory information that has been stored in the brain from the foundational years of development. “Adults take it for granted, but sensations from the body are absolutely necessary
to tell the brain how to put on a pair of pants, butter a piece of bread, or dig a hole in the ground” (Ayres, 1979; 2005).

Finally, the sensory integration theory points out the critical nature of the first seven years of a child’s sensory experiences. These experiences can mold and shape a child’s future. The information presented in the abbreviated stages provides a strong structure of sensory development for students with or without ASD. However, atypically developing children with ASD may not have experienced various stages of sensory integration between birth and age seven. For the purpose of this study, it was important to understand any gaps missed throughout these developing years that could best serve students with ASD and HFA at the secondary level.

Understanding how the brain processes sensation. If you think of an atrophied muscle, you can imagine it being weak without getting much use. When you use a muscle continuously, it gets stronger. Sensory integration works much in the same way: the more sensory integration is applied to the brain the more a child can learn and grow from those experiences. Every time a neural message makes a connection to a synapse, a spark occurs which makes it easier for similar messages to cross that synapse in the future allowing for muscle memory. Ayres (1979) stated, “over 80% of the nervous system is involved in processing or organizing sensory input” (p. 28).

Each person processes information very differently. A neural impulse must pass through two or more neurons to form a sensory experience, a motor response, or a thought (Ayres, 1979; 2005). When a function becomes more complex, the more neurons need to be involved in transmitting messages. The constant interaction of sensory and motor systems through limitless interconnections bolsters meaning to sensation and adds purpose to movement. Sensory motor interaction provides a strong infrastructure for later cognitive functions.
The sensations. Sensations are like food or nourishment for the nervous system. Every movement sends sensory input to the brain that is then interpreted as information. Without a variety of sensations, the nervous system cannot develop properly. Sight, sound, and touch are sensations we all experience even before birth. Light stimulates the retina that sends information to the brain to read as visual. Sound waves stimulate the auditory receptors in the inner ear that send information to the brain to understand sound. Ayers stated, “If the auditory information did not intermingle with other types of sensory information at each level of the brain, we would have trouble making meaning out of what we hear” (p. 34). Lastly, the tactile system is the largest sensory system and it plays a critical role in human interactions and behaviors on both a physical and mental level.

Critics of Sensory Integration Theory

Criticism of Sensory Integration Theory breaks down into three different categories of the sensory integration theory based upon professional perspective. Occupational Therapists’ (OT), special educators’, and Speech Language Pathologist (SLP) offer different nuances of criticism.

Occupational therapists. In recent research, occupational therapy (OT) scholars have proposed a paradigm shift relating to the terminology used to describe clinical problems (Miller, Anzalone, Lane, Cermak, & Osten, 2007). Instead of sensory integrative dysfunction, the proposal calls for the diagnosis to be renamed sensory processing disorders. The reasoning behind the slight change is not intended to change actual approach, but only the terminology for diagnostic categorization (Miller, Anzalone, et al., 2007). This presents confusion in and outside the field of occupational therapy regarding terminology for the clinical problems such as sensory integrative dysfunction verses sensory processing disorder alongside proposed subtypes. What’s more, this further complicates the terminology for intervention approaches because literature
regularly classifies sensory-based interventions under sensory integration (Schaaf & Davies, 2010). In sum, it appears the major critique OTs have is the debate between terminology for intervention purposes.

**Special educators.** Special educators are not typically trained in teacher education programs on sensory integration or sensory integrative dysfunction. This makes understanding how to help students difficult. Grounded research supports sensory integration theories, approaches, and assessments in occupational therapy training. SI therapy and interventions are intended to normalize sensory processing and enhance the development of higher, dependent, cortical functions, such as oral and written language (Mauer, 2001). Cohn & Cermak (1998) indicate that SI treatment was never intended to be provided apart from special education services. But, within special education services, occupational therapists are the experts in SI therapy; special educators are not. It seems that sensory integration theory has yet to make the ontological leap from OT to Special Education. In my experience, we had SI as a part of therapy in the specialized private schools. In fact, most special education teachers only learn of SI through OTs embedded in the classrooms within these specialized environments.

Leong, Stephenson, & Carter (2014) conducted a study with Malaysian teachers applying SI therapy on students. This study found that 82.3% of Malaysian special educators appear to depend on training from other teachers. Although responses from senior teachers and administrators in previous research (Leong et al., 2011, 2013) suggested that OTs may play a primary role in advocating SI therapy to special education teachers, the responses from teachers in the current research indicated that teachers, especially Malaysian teachers, are more likely to be trained in SI therapy by other teachers. It is apparent that OTs play a substantial role in advocating interventions of SI therapy to teachers and administrators.
Speech language pathologists. Speech Language Pathologists (SLP) suggest that SI theory requires many components and language assessments. Because of the complexity of the various areas that depend on and interact with each other, as well as the child’s personality and environment, it is not possible to apply a single list of symptoms that identify sensory integrative dysfunction for all children (Mauer, 2001).

Typically, sensory integrative dysfunction (SID) is usually assessed and treated by OTs or physical therapists. However, there are children with SID that have language delays or difficulty with auditory processing, learning, and organization and could be at risk for language disorders. SLP and other professionals should be a part of the team planning and decisions in regards to the communication and educational needs of the child. The assessment and treatment of a child with a language learning disability (LLD) should not only address SID but also educational, psychosocial, and communication areas (Clark, Mailloux, Parham, & Bissel, 1989). In other words, SI theory does not account for and incorporate language issues.

Another concern is the discordance between the context of research and the clinical context of SI treatment. Various factors must be taken into consideration such as a child’s characteristics, treatment setting and the impact of SI treatment programs. Mauer (2001) finds the SI treatments in public school are less comprehensive in comparison to the traditional SI treatment approach that is usually the subject of outcome studies. Generally, in SI treatment programs, language and cognitive abilities are not addressed. Instead, gains in higher-level abilities are hypothesized as eventual outcomes of enhancing sensory registration, sensory integration, and general programming capacity. The rationale behind this is that by using integrated treatment plans aimed to capitalize on how sensory motor and speech/language skills rely on each other, the outcome is children can organize their neurological system, make
adaptive sensorimotor responses which will make faster gains in speech and language acquisition (Fallon, Mauer, & Neukirch, 1994; Klecan-Aker, Green, & Flahive, 1995; Windeck & Laurel, 1989). Further, there is limited research on effectiveness of SI therapy or integration with children with LLD who fall in the category of sensory integrative dysfunction.

**Rationale**

Sensory integration theory is appropriate to the study because sensory integrated curriculum, approaches, and techniques applied to students is the focus of the study. As the study revolves around sensory integration practices, the theory will inform research regarding teacher practice in the classroom. Sensory Integration Theory is heavily rooted in the OT field and as a special educator, it seems paramount to understand the root of this theory and how it can be applied through a general and special educator’s lens to best support students in the inclusion setting.

Ayres explored the importance of understanding sensory integration from birth to age seven and how it can truly impact a child when sensory integration isn’t applied correctly or at a critical developmental age. When sensory integration is not applied during the critical years of development, severe deficits in children can result which may lead to concerns in the academic classrooms. Since my study focuses on students with ASD and HFA at the secondary level, this theory points a way forward in aiding the process of closing the gap between elementary and secondary students in receiving the services and tools they need to become successful in the classroom.

**Conclusion**

Students with ASD require sensory integrative approaches within the classroom setting. While it is important to understand the theory of what sensory integration is and how it can be
applied, it is also necessary to recognize the big picture of how students with ASD can best be supported within the public-school environment through a local, state, and global lens and how support staff such as OTs, SLPs, general educators, special educators, and administrators can apply sensory integration in a holistic approach. Next, chapter two explores the research literature domestically and internationally regarding sensory integration.
Chapter 2: Literature Review

This literature review is broken in five strands. Strand one will describe the history of special education. The second strand will review the history of autism and how far parents, educators, and doctors have come in understanding the world of autism and how to better serve the needs of students and children in and outside of the classroom. Many students with Autism Spectrum Disorder (ASD) are misunderstood in the learning environment due to lack of knowledge on how to meet the needs of the student. Strand three will explore sensory integration and its importance to student learning. Strand four will explore student-learning needs in the classroom and what students with High Functioning Autism (HFA) experience. Strand five will investigate how sensory integration can be integrated in the classroom while comparing the primary and secondary level. Moreover, this strand will discuss the gaps in literature and how sensory integration at the secondary level is lacking in research, yet how it compares to education overseas.

Special Education History and Policy

Understanding the trajectory of special education history provides a starting point with which to understand the intersection of autism, sensory needs, and the Common Core curriculum situated in the secondary school classroom. Prior to the 1960s, children with cognitive or emotional disabilities, deafness, blindness or the need for speech therapy were not allowed to be educated with the general education population. Parents had few options other than to educate their child at home or pay for expensive private education. It was not until 1961 when President John F. Kennedy created the President’s Panel on Mental Retardation. This recommendation included federal aid to individual states. However, in 1965, President Lyndon B. Johnson signed the Elementary and Secondary Education Act (ESEA), which provided funding for primary
education. This began the expansion access to public education for children with disabilities (Special Education News).

People with disabilities are people first, and it is preferred to use the term ableism to define the oppressed people with disabilities as a social justice issue (Adams, Bell, & Griffin, 1997). Laura Rauscher and Mary McClinktock (1996) define ableism as:

- a system of exclusion that oppresses people who have mental, emotional, and physical disabilities deeply rooted beliefs about health, productivity, beauty, and the value of human life, perpetuated by the public and private media, combine to create an environment that is often hostile to those whose physical, mental, cognitive, and sensory abilities fall out of the scope of what is currently defined as socially acceptable (p. 198).

Because of cultural norms, people with disabilities were not seen as equals to their counterparts, but since ESEA act of 1965, it became a legal issue that students with disabilities had a right to an education. Smith (2004) declares that students with disabilities were slowly allowed in the classrooms in the mid 1960s as teachers learned to structure the environment with rigidity to reinforce appropriate behavior for learning. Scripted reading and math programs were common and teachers were told exactly what to teach next and precisely how to teach it, even down to the specific words and motions to use. This was a time where educators felt the more rigid the lessons the more effective and appropriate it was for special education students due to predictability and structure.

By the 1970s there were only a relatively small number of children with disabilities being educated in public schools. This later sparked the two federal laws in 1975 that would change the trajectory of special education history forever. The Education for All Handicapped Children Act (EHA) established the right to a public education for all children regardless of disability and the
Individuals with Disabilities Education Act (IDEA) required schools to provide individualized or a special education program for students with disabilities, which is also a Free Appropriate Public Education (FAPE) (Special Education News).

On March 28th, 1982 a daylong conference was held at Pace University School of Law in White Plains, New York with fourteen educational administrators, lawyers, and academics, representing a wide variety of political, administrative, and legal perspectives. These people were organized in three panels, Accommodating the Rights of Individuals in Public Schools, The Role of Administrators in Maintaining an Efficient and Equitable Public Education System, and Financing Public Education on an Equitable Basis. This meeting came about because parents and taxpayers were increasingly dissatisfied with many aspects in public education for all students, and something needed to be done (Gelfand 1982).

Gabel & Danforth (2008) state, in the 1990s, global attention was given to education as human rights through Education for All (EFA). The goals for EFA related to international agreements to build a political framework for the government to increase universal childhood education, literacy, gender equality, and excellent access to higher education. The 1994 Salamanca Statement and Framework for Action ushered in an era of individualized instruction turning point in special education and disability policy. The Salamanca Statement professed that children with special needs must have access to school and they should be accommodated within a child-centered pedagogy capable of meeting their specific needs. The inclusive model is most effective in combating discriminatory attitudes, which helps build a safe learning environment for all learners (Section 2).

Looking at the history of special education as a whole, it is evident that education has come a long way since the 1960s in believing that all students can and will receive an education.
Given the discriminatory history of special education, the inclusion model is the most equitable approach in teaching all learners. This ensures every child is receiving a Free and Appropriate Education (FAPE) attempting to meet all of their needs. While all special education students are entitled to individualized instruction to suit their needs, students with autism are a small piece of the special education mosaic of students with diagnoses.

**History of Autism**

**Autism spectrum disorder (ASD).** Kluth (2003) stated, “autism is so complex because it’s a spectrum disorder. It’s like saying, ‘Define the Middle East.’ What country? Iran? Syria? Autism is the same” (Foreword xi). Autism Spectrum Disorders (ASD) are a group of developmental disabilities that are categorized based on impairment in social interactions, abnormal development and use of language, and monotonously repetitive behaviors (Holaday, 2012). Autism ranges from profound communication and behavioral concerns to social difficulties with normal development and in some cases, unique talents in math and science. ASD typically manifests and is diagnosed between the ages of 18 months to three years old. Holaday (2012) explains, that an average of 1 in 110 children in the United States have ASDs. ASD does not discriminate between racial, ethnic, or socioeconomic groups and is mostly prevalent in boys (Rice, 2009).

Eugen Bleuler, a Swiss psychiatrist and psychologist, first classified autism as ambivalence (Kuhn, 2004; p. 363). Bleuler described ambivalence in three forms, affect (positive and negative feelings), will (stuck between wanting or needing), and intellectual (when one word has two opposite meanings) constructed the term autism around 1912 that often referred to autism as an an escape from reality. Autism and autistic come from the Greek word autos, meaning self. The term originally referred to a basic disturbance in schizophrenia, referring to an
extreme withdrawal of oneself from social life (Firth, 2003). Language delays, literalness, inability to use language for communication, a desire for “aloneness”, and an ability to relate to objects in their environment only when they wanted to without interfering with their self-imposed isolation were early hallmarks of autism (Kanner, 1943). In the late 1940s and 1950s, the term “refrigerator mothers” was used colloquially in reference to mothers who had children with ASD that appeared detached from reality or developmentally inappropriate social norms. The term “refrigerator mother” was developed because it was assumed if a child was distant and detached from reality, it was because the mother was cold and disinterested in their child.

An Austrian-American psychiatrist and physician by the name of Leo Kanner published a landmark paper called, “Autistic Disturbance of Affective Contact” which described 11 students who were highly intelligent but demonstrated a strong desire for “aloneness”. He believed there was no scientific reasoning behind ASD; it was purely environmental caused by parents’ perfectionist, distant and cold behavior toward their child. Around this time period, a doctor named Hans Asperger, a Viennese psychiatrist, was documenting similar behaviors in children in Austria. Dr. Asperger has become famous for the ASD “Asperger’s Syndrome” (Wing, 1981). He found children with this diagnosis were poor in social and emotional relationships, idiosyncratic language use, and demonstrated a lack of feelings for others.

Dr. Bernard Rimland, an American research psychologist, writer, and an advocate for children with developmental disorders was a parent of a child with autism and he challenged the cold and neglectful parent based on his own experiences (Rimland, 1964). Because Rimland did not believe in the refrigerator mother/parent ideology, he wrote a book for parents who felt like victims of this stereotype to share that autism was a neurological disorder, not an environmental one. Parents of autistic children organized and founded the National Society for Autistic
Children in 1965, now called Autism Society of America, and currently has over 200 chapters (Holaday, 2012).

**High functioning autism (HFA).** In recent years, there has been considerable debate about the differences between ASD and HFA. It has been pointed out that a major difference is the initial description of the syndromes that suggest they may diverge in critical ways. Meaning, HFA is a part of ASD but HFA requires different interventions or prognosis (Ozonoff, South, & Miller, 2000). Between 1944 and 2013, Asperger’s Syndrome was considered a diagnosis in the Diagnostic Statistical Manual (DSM). In May of 2013, The American Psychology Association (APA) published the 5th editions of the DSM and Asperger’s Syndrome was removed as a diagnosis.

In past history, children with Asperger’s syndrome were considered high functioning. Sole-Smith (2014) state that there are mixed emotions from parents and people diagnosed with Asperger’s having the classification removed from the DSM. Some parents feel having the label “Asperger’s Syndrome” separated their child from the autism label because it was considered high functioning and it did not put a social or academic stigma on the child. However, other parents feel not having the specific label of Asperger’s Syndrome can be troubling because the criteria for being put on the spectrum is much more difficult to make the ASD cut. This can prevent children from getting the services, behavior therapy or other accommodations they may need in the classroom.

Although autism is a spectrum, recognizing that ASD and HFA are slightly different is important. Overall, understanding the history of autism can only help families, individuals, and educators know how to properly meet the needs of these students and children. Because autism is better explained today, educators are not only able to distinguish the different between high
function autism and autism, but they can exercise flexibility within their teaching approach and style. In other words, teachers need a degree of flexibility and should not circumscribe a student with autism with a host of rules dishonoring their individuality.

**What is Sensory Integration**

The research literature is replete with sensory integration studies at the preschool and elementary level. According to the research, Occupational Therapists believe if they can implement sensory integration at a young age, they can correct weak areas in the developmental stages, or, help promote a stronger foundation of sensory breaks to improve the focus, socialization, and academics of the student. Within the last fifteen to twenty years, the research demonstrates that Occupational Therapists have found a significant amount of success when implementing sensory diets on a daily basis for a student with special needs. “Engaging children in sensory experiences on a regular schedule can help them focus, attend, and interact” (Yack & Colleagues, 2002; p. 73).

The combination of a sensory diet routine and environmental modification in association with therapeutic interventions provides the child with various ways to address their specific sensory needs while promoting successful participation in daily activities (Reinson, 2012). The use of sensory activities includes oral motor, vestibular and proprioceptive, tactile, visual, and auditory input (Bundy, Lane & Murray, 2002; Wilbarger, 1984, 1995; Wilbarger & Wilbarger, 2002; Williams & Shellenberger, 1996). The types of students who benefit from sensory diets on a daily basis include students with language impairment, central auditory processing disorder, dyslexia, Asperger’s syndrome, attention deficit disorder, dyspraxia, development coordination disorder (DCD), and emotional behavior disturbance (EBD).
An American occupational therapist and educational psychologist named A. Jean Ayres, coined the term Sensory integration (SI) theory, in the late 1960s and early 1970s (Ayres, 1991; Baranek, 2002; Watling & Dietz, 2007). Ayres’s (1972) describes sensory integration as the neurological process that organizes sensation from one’s own body and from the environment and makes it possible to use the body effectively within the environment (p. 11). SI theory is based on the understanding that interference of the neurological processing and sensory information can potentially disrupt the development of purposeful behaviors (Schaaf & Miller, 2005; Watling & Dietz, 2007). Interventions based on Ayres’ classic SI theory are typically planned, controlled sensory input in relation to the needs of the child (Pfeiffer & Koenig & Sheppard & Henderson, 2011).

Pfeiffer & Koenig & Sheppard & Henderson (2011) quoted Bundy, Lane, & Murray interventions (2002) stating SI-based treatment is defined as a program of interventions involving meaningful therapeutic activities that are characterized by enhanced sensations that include tactile, vestibular, proprioceptive, active participation and adaptive interaction (p. 479; p. 78). Sensory processing disorder (SPD) is prevalent among children with ASD. In fact, researchers claim the percentage as high as 88% (Baranek, 2002). Children with SPD and ASD typically have challenges self-regulating responses to sensation and stimuli and could potentially use socially inappropriate self-stimulation such as playing with genital body or picking their nose while working with classmates to compensate for the limited sensory input or self stimulate to avoid overstimulation (Roberts, King-Thomas & Boccia, 2007; Schaaf & Nightlinger, 2007; Smith, Press, Koenig, & Kinnealey, 2005).

Students with disabilities are included in the inclusive classrooms with general education students. This means teachers must understand and know their learners in order to reach the
needs of all learners. Samuel Orton and Anna Gillingham collaborated as pioneers in the field of learning disabilities to exam the cause and treatment for dyslexia in the 1920’s. Orton (1937) took the idea of learning through multiple senses and mediums and applied this to literacy. In the Orton-Gillingham methodology, the instructor’s objective toward multisensory learning is intended to help practicing classroom teachers reach students who may be struggling with traditional curriculum.

Multisensory learning (MSL) is a natural way to teach students that everyone gathers information in various ways and MSL utilizes multiplicity sensory pathways. The more intensely the sensory pathways are used, the more efficiently and effectively information is retained (Montessori, 1967, Orton, 1937). Some researchers (Borek & Thompson, 2003; Kavanaugh, 1991; Shaywitz, 2003) posit that various neurons in the brain only fire when multiple sensory pathways are stimulated and utilized. All people have a cognitive filing architecture used for storage and retrieval of thoughts, ideas, and concepts; however, students with disabilities require more sensory integrated activities to access and activate theirs compared to their non-disabled peers.

There are several sensory atypical behaviors that may be the root cause of autistic symptomatology. This suggests that essential atypicalities in sensory processing could potentially lead to developmental concerns in children with ASD such as language and social awareness (Hutt et al., 1964, p. 908). The nature and to what degree of hypersensitivity, hyposensitivity, and sensory-seeking behaviors needs to be better understood by teachers when working with students with ASD.

The evolution of the nervous system. Ayres connects animal adaptive responses to humans. She examines the adaptation in the animal world as the ability to make sense of the
body within its environment. This involves interpreting sensations accurately in order to make appropriate responses. The same can and should be applied to humans. When a child is developing in the early stages of sensory integration, they are learning how to adapt to their environment. Just like animals, humans that can survive in their environment successfully have learned to adapt through developed sensory motor functions. Once children are of school age, it becomes clear to someone familiar with sensory integration what a child is lacking. Sarnet, Harvey, Netsky, & Martin (1974) state, “schools make the mistake of trying to develop the child’s visual and auditory systems independently of the other senses. Parents can partially rectify that mistake by allowing their child to get the tactile, vestibular, and proprioceptive experiences they want and need”.

**ASD sensory processing disorder.** There are three aspects of poor sensory processing that are seen with children that have autism. This section is broken into three sub-sections: registration of sensory information, modulation of sensory input, and integration of sensations. The following sections explore how sensory integration can truly benefit children with ASD.

**Registration of sensory information.** Familiarity and recognition are things the average person probably takes for granted. When driving, you may recognize familiar streets, or signs, or have a “feeling” you are close to your destination. Our brains may pick up an object worth noticing that we are not even aware of. This is a sign that our brain is registering an image or object that may have been previously ignored. In the brain, the limbic system helps decide which sensory input should be “registered” or brought to our attention and also decides whether the information is worth applying. For children with autism, this part of the brain is not working in the same capacity as those children without autism. When this part of the brain is very weak, auditory and visual inputs are ignored or do not register. Further, this leaves a child with ASD to
not attend to sounds, noises, or when a person is speaking to them. Or, the very opposite can occur. For a person without ASD, when hearing a sound or seeing a visual that is continuous, one learns to tune it out. Often times, a child with ASD will pay more attention and over-register one sound and under register another sound often leading to frustrated fixation.

**Modulation of sensory input.** Not only does a child with ASD miss sensory input, but fails to modulate input with vestibular and tactile sensations. Not having a strong awareness with gravitational pull in the foundational years can greatly affect a child’s sensory development later on. For example, a child with ASD may feel most comfortable in a swing with a parent which allows them to feel grounded. Moreover, attempting to turn them upside down or put them in high places will cause great anxiety because it is an unfamiliar position. Ayres (2005) states, “If a child is gravitationally insecure, at least he is registering some sensory input, and therapy is then more successful” (p. 126).

**Integration of sensations.** Since registering sensations from the environment is a challenge for children with ASD, the process of integrating various sensations to form a clear perception of space and relationship to space is another test. For example, if a parent wants their child to wear a brand new sweater, this may be hard to accept because of their lack of sensory integration. Meaning, the sweater is not a familiar object and any new situation or experience will present the child with a bewilderment array of non-organized sensory and visual stimuli. A slow integration that may involve allowing the child to touch (tactile) the material first, then perhaps drape around their shoulders to get them familiarized will allow the registering process to occur slowly. The biggest issue with the integration of sensations lies in the fact that the child with ASD cannot learn to plan movements, attributing to not easily feeling their body or
knowing what they are doing. This is due to lack of physical basis from foundational development stages.

Ayres’ work in sensory integration has brought great attention to educators who may not be familiar with this methodology and approach in the classroom. The three aspects of poor sensory integration: registration of sensory information, modulation of sensory input, and integration of sensations provide a substantial description of what to look for in a student with ASD or HFA within the classroom. Children born with ADS today have an advantage compared to children born with ADS many decades ago.

**Student Learning Needs**

Ayres’ seven developmental stages are key components to a strong foundation in sensory integration. The first stage is the first month of a baby’s life where they are first introduced to touch, taste, gravity, joint, and muscle movement, sight, sound, and smell. The second stage consists of the child’s second and third months when exposure to rising up and grasping along with incorporating sensory integration with eyes and neck begin. During the fourth and sixth months of a child’s life, they are experiencing the joy of being moved and interacting with their environment. In the sixth to eight-month period, a child is experiencing spatial awareness, babbling, and motor planning. In the ninth and twelfth months, a child is beginning to play, stand, and use words. The second year of a child’s life involve many sensory inputs such as localization of touch, mapping their body and moving throughout their environment. Lastly, the years between ages three and seven are all about a child’s sensory integration with tools such as forks, crayons, scissors, etc. See Appendix A for a detailed listing of stages.

Sensory Integration Theory is mostly understood, used, and applied in the occupational therapy (OT) world. Occupational therapist’s work involves evaluating a child’s performance in
the classroom based on sensory, motor, and praxis issues, which also incorporates sensory integration within their practice (AOTA, 2014b; Lane, Smith Roley, & Champagne, 2013; Stewart, 2010; Watling et al., 2011). Several screenings and assessments have been developed over several decades to assess a child’s sensory, motor, and praxis abilities.

- The DeGangi–Berk Test of Sensory Integration (DeGangi & Berk, 1983)- a preschool screening focused on sensory based motor functions
- The Sensory Integration and Praxis Tests (SIPT; Ayres, 1989) is a standardized performance measure used to identify sensory integrative dysfunction related to learning and behavior
- The Sensory Processing Measure: Home Form (Parham & Ecker, 2007); Sensory Processing Measure: Main Classroom and School Environments Form (Miller-Kuhaneck, Henry, & Glennon, 2007)
- Sensory Processing Measure–Preschool: Home Form (Parham & Ecker, 2010)
- Sensory Processing Measure–Preschool: Main Classroom and School Environments Form (Miller-Kuhaneck, Henry, & Glennon, 2010) are integrated systems of rating scales that enable assessment on the basis of parent in preschool through elementary school-age children.
- The Sensory Profile 2 (Dunn, 2014) includes infant, toddler, child, and school rating forms, and the Brown & Dunn, 2002) consists of standardized questionnaires that focus on the student’s sensory processing performance patterns within the natural context

Roley, Bissell, Clark, and Amini (2015) explain, “when children demonstrate sensory, motor, or praxis deficits that interfere with their ability to access the general education curriculum, occupational therapy using an SI approach is appropriate” (p.3). Throughout the last twenty
years, researchers have identified a span of behavioral responses of children with ASD to sensory aspects of their environment (Baranek et al., 2014). The most common features seen include hyper-responsiveness which is an overreaction to sensory stimuli, hypo-responsiveness which is a decreased response to sensory stimuli, sensory seeking which are behaviors directed at receiving intense or unusual sensory stimulation, and enhanced perception which can be seen as an acute aware of sensory stimuli. To someone who is unfamiliar with sensory integration, these behaviors can be seen as a choice or represented in experiences that imply a child may like or dislike choices. However, this is more of an internal response that cannot be as easily controlled and should be viewed through a holistic experience for each child (Kirby, Dickie, Virginia, & Baranek, 2015).

Children with ASD find it challenging to regulate input into their central nervous system resulting in the senses: touch, sound, taste, smell (Friedlander, 2009). Often times, when a child does not know what sensory experience they like or do not like, they may not be able to articulate what their body is processing. Meaning, simple and basic responses such as, “I don’t like this”, or “That didn’t feel good” may be as much as they can express. To an educator, this is not helpful when trying to understand how to connect with the student in the classroom setting. Kirby, Dickie, Virginia, & Baranek (2015), explain that a child may frequently characterize a sensory experience by their initial reaction and more than often, their reaction will be followed with a strategy that worked for them. For example, if something was too loud a student may cover their ears, or leave the room, or ask for noise cancellation headphones.

**Sensory Integration in an Inclusive Environment**

All individuals take in sensory information differently from their environments. Inclusive education attempts to attach understanding and meaning to sensory experiences for each student
in the classroom. Sensory options for the classroom do not need to be expensive or extravagant. Tactile, calming, and olfactory examples for sensory tools include shaving cream, play dough, cotton balls, sand, beans, bubble wrap, and a rolling massage. All of these manipulatives can be used as a sensory break in between lessons or classes in order to increase time on task (Reinson, 2012).

It is recommended to find certain times of the day to carve out 5-10 minutes (depending on the student and the day) to find consistency in providing options. At first, incorporating several options is a great way to introduce the new routine to students. After the teacher, student, and family begin to see small changes; it makes sense for the teacher to facilitate self-advocacy in the students especially as the students learn which strategies work for them.

Baglieri, Bejoian, Broerick, Connor, & Valle (2011) agree with Ainscow, Booth, and Dyson’s (2006) stance on inclusion supporting students with disabilities (p. 2) which further promotes the dominant American educational discourse (p. 2125). In many cases, the below average student is atypical compared to above average students that are often labeled gifted. Baglieri et all (2011) explain the above average students to be highly intelligent, creative, and worthy of high esteem. These children are viewed as the most ‘promising’, and hence desirable, citizens (p. 2135). Due to American educational discourse, the more ‘promising’ students are usually catered to first. This leaves the ‘below average’ students left out leaving them little to no room for sensory opportunities in the classroom. Historically, an inclusion environment is a place for students identified with disabilities to spend greater than 80% of their day in general education classrooms in proximity to nondisabled peers (p. 2126).
**Primary Level Sensory Integration: Case Study**

Longitudinal research studies between Occupational Therapists, Special Educators, and students demonstrate that sensory diets significantly improve many aspects of a students’ lifestyle. One such study explored the sensory input of three young boys who were four years old. Two of the boys were developmentally delayed and one was autistic. One of the developmentally delayed participants displayed tactile defensiveness and inconsistency when reacting to teacher directions by screaming and crying. This behavior also manifested during a structured one-on-one setting. The second participant who also had developmental delay demonstrated resistance to being touched and would cry or scream if anyone left the classroom. This participant also hit his head when angry or frustrated, and covered his eyes to avoid task demands. The third participant, who had autism, demonstrated target areas in the ability to attend to tasks, people, and complete transitions smoothly (Bonggat & Hall 2010).

Based on the needs of these students, the staff to student ratio ranged from one or two students per adult. There were several sessions ranging from different times in the day in which the students participated. The boys were use to a consistent schedule of getting to school, going into their classroom, putting their backpack away, and participating in their individualized sensory diets. These breaks were 5 minutes of each 15-second activity with 10 seconds’ observation and 5 seconds recording. Two of the students received additional sensory integrative based on occupational therapy for half an hour three or four times a month respectively with a trained occupational therapist who worked specially on goals from their IEPs (Bonggat & Hall 2010).

Overall, major growth in several areas occurred with all of the participants. What appeared to make the most difference on task behavior was the individualized attention in a one-
on-one education activity verses an independent activity. One student’s progress was so significant that the IEP team made a major decision to remove daily sensory diet from his IEP and place him in a least restrictive classroom (LRE). Meaning, an inclusive environment was a better fit for this student.

Another case study with a five-year old boy with autism and ADHD demonstrates the efficacy of a sensory diet. This 10-week study involving two-licensed occupational therapist working very closely with the participant targets specific goals in impulsivity, distractibility, and rigid behavior. His mother described a happier child with less-rigid behaviors, and increased tolerance of unexpected changed in the routine. She reported her son was able to go places without prompting ahead of time, she also noticed a decrease in activity level, distractibility, and impulsivity (Schaaf, Hunt, & Benevides (2007).

Frankie, a 2003 case study, was a five-year old from England. Prior to the case study, it was reported that he had several violent episodes at school towards staff and peers. This student would kick and throw shoes at staff and appeared very unsettled throughout his day. It was also reported that he would upturn tables, throw chairs, leave the building and accost staff; he was often sent home early. It was clearly apparent Frankie would direct his frustrations at adults, peers, and property.

“An effective teacher with spectrum children and adults is one who is a good detective and looks for the source of learning difficulties” (Grandin, p. 128). Chilvers & Cole (2006) explain a sensory environment that incorporates a calming light, therapeutic smells, and soft music to set a calming mood to invite students who may be over stimulated. Providing a peaceful sensory environment can make a difference in their demeanor. An aromatherapy program
alongside relaxation techniques or relaxation through story telling is an effective sensory break. (Keddleston Placement Group, 2005)

Students like Frankie mirror similar traits and behavior to my student explained earlier. They are easily irascible and impetuously emotional due to environmental sounds, peers, or internal stimulation. It is highly beneficial to provide a calming and relaxing environment. After several sessions with a sensory environment, Frankie became very compliant and was open to the relaxing music and non-threatening space Frank was even cozy enough to fall asleep. Because Frankie had an opportunity to relax and calm down, he was able to open up and talk about what was bothering him. Temple Grandin, a pioneer in the field of autism has excellent insight on children with autism because of her personal experiences growing up with autism in the 1950s when autism was not understood. She stated, “Teachers who truly want to help students with sensory and perception difficulties will figure out the child’s unique learning style and adapt teaching methods accordingly” (p. 128).

**Secondary Level Sensory Integration: Case Study**

Waters & Boon (2011) researched three high school students with autism and mild intellectual disabilities in a self-contained classroom. The students ranged from 14 to 16 years old with a mean of 14.75 and intellectual quotient (IQ) scores vary from 61 to 64, with a mean of 63. The multisensory program that was explored in this research study was TouchMath©. This program consists of an instructor modeling how to count the “dot-notations” on each number ranging from 1-9. Students were given an opportunity to practice with the special educator using touch-points. After using this multi-sensory approach for about two months, students, teachers, and parents reported this approach was beneficial. Students exclaimed the strategy was easy to use and they were able to compute basic addition and subtraction. Although this was successful
for these students, this is a limited study considering there were only three participants so it makes it difficult to generalize touch point strategies to all special education students at the high school level.

Outside of a multisensory curriculum or approach such as TouchMath®, educators can incorporate a variety of strategies like art and drama therapies that are built around certain curriculum areas that address emotional needs so students will be available for the academics (Pagliano, 2001). A ‘Sensory Suitcase’ is a place where various tools can be explored to meet various sensory needs of students. Often times, students who are not aware of their hypersensitivity or hyposensitivity may not know what they need to satiate their sensory need. By providing various objects that feel, touch, smell, and taste differently can allow the student to follow their biological need to quench their need for sensory input or to calm down their sensory overload.

**Secondary Inclusive Classroom**

The secondary context presents unique challenges to inclusion; secondary teachers contend with large student caseloads, minimal planning time, carried instructional formats, and high expectations for student proficiency (Kozik, Cooney, Vinciguerra, Gradel, & Black, 2009; Scanlon, 2003) Little research exists to guide secondary regular or special educators’ instructional accommodation practices (Byrnes, 2008), therefore leaving holes in their understanding of the appropriateness of inclusion at the secondary level. Moreover, after researching literature in secondary inclusion classrooms, it is beginning to surface that there is a gap in finding sensory education in American schools throughout the day.

In addition, it appears the co-teaching model is not thoroughly understood by teachers to better serve the needs of the students at the secondary level. Teachers must ensure that students
with and without disabilities benefit from the least restrictive environment. It has been reported that teachers are unsure how to provide accommodations and are often only willing to provide such accommodations that do not “disrupt” their classroom routine (Nichols, Dowdy, & Nichols, 2010). While synthesizing this research it became apparent this is not just a concern in the United States, but a problem overseas as well.

**Inclusion Overseas**

**The Netherlands.** Examining the idea of inclusion in other countries becomes questionable when compared to inclusion in America in numerous ways. In the Netherlands, studies proved that parents were less comfortable with the idea of inclusive classrooms due to fear of disabled students socializing with the non-disabled students and how it might impact the non-disabled students. As for the academics, parents had doubts about possible negative effects of unusual behavior of children with disabilities on their own children and wonder whether teachers are qualified enough in educating children with disabilities (de Boer & Munde, 2015). Parents expressed a more positive outlook on students who simply have motor or sensory impairments. However, when students who have more severe disabilities and behavioral concerns are included in the classroom environment, parents tend to take a more negative approach.

Historically in the Netherlands, fathers and older parents were negative about the idea of inclusion with more severe students. This is partly because fathers spent a large amount of time at work leaving the involvement with the teachers and schools to the mothers. Further, older parents may not have experience with the inclusive model to fully understand the positive benefits on both the special needs and general education student. The root of the problem in regards to lack of inclusion in the Netherlands stems from the fact that there is not proper teacher
training available to prepare teachers for the inclusion of children with severe disabilities. The Dutch recently implemented the new Inclusive Education Act of 2014. This law mirrors IDEA (1975) in American school. This makes it critical to provide teachers with additional support.

**Greece.** A study in Greece reported that younger teachers with fewer years of experience but exposure to the special education needs (SEN) training had positive attitudes towards SEN in the inclusive environment. Even though the older teachers received the same training, they were more pessimistic about implementing this training in the inclusive classroom. Perhaps the more experienced teachers did not have the tools to know how to implement the SEN training and accommodate the needs of the SEN learners.

This training in the Greek secondary schools was found to influence the perceptions regarding pupils with special needs leaving these teachers comfortable having students with SEN in the classroom. They felt capable of providing adequate support socially and academically to the SEN students (Coutsocostas & Albortz 2010). Overall, the Greek special education system has been said to lack support services, materials, personnel, programmes, (Lammpropoulou and Padeliadu 1995), infrastructural equipment and financial resources (Koutrouba et al. 2008).

**Canada.** A teacher of 25 years in Alberta, Canada felt the idea of an inclusion classroom is ideal, however, not always for every student. The range of instructional options and supports in place in a differentiated classroom will address many of the unique learning needs of students with disabilities. In addition, teachers who have the knowledge and skill set to implement a differentiated approach may be more willing and able to further adjust instruction to meet the needs of students with more intensive learning disabilities (Alberta Education 2010, p. 116).

**China.** Typically, parents support inclusion classrooms for the socialization and academic level for their special needs child. However, in Hong Kong, the teachers appear to be
trained in specialized students with disabilities, but find challenges in socializing the students with each other. “More social interactive and cooperative activities should be designed in the formal and informal curriculum so as to foster social participation in Whole School Approach schools (Lan & Tsang 2011).

Hong Kong has been practicing Whole School Approach, which is their version of inclusion, for a decade. However, the school resources have been primarily used in the area of teaching and learning, very little has been spent on student resources. Student participation in the form of peer support, cooperative learning or social community is vital to the success of an effective inclusive environment. Through social learning processes, more knowledge of social value, and social relationships will then be developed in the Whole School Approach community (Lan & Tsang 2011).

**Why is Secondary Sensory Integration Missing in American Schools?**

After finding excellent and thorough research for sensory integration at the primary level, it became apparent there is little to no research about sensory integration at the secondary level in American schools. This appears to be problematic seeing that special education students do not lose their diagnosis once they enter middle and high school. Pagliano (2001) believes if students had occupational therapy at the primary level and thrived, why change the accommodations throughout the maturation process without adequate reasoning or proper release of services? There are many ways to incorporate sensory diets for middle and high school students that do not make them stand out or look different from their peers (Pagliano, 2001)

Sensory diets are important for students with special needs. It can add a rich component to their daily routine. Special and general educators need to fully understand the whole child, their IEP goals, and recognize how to implement a sensory diet that is appropriate for their
specific needs. Understanding the different components of the sensory input (oral motor, vestibular and proprioceptive, tactile, visual, and auditory input) plays a major role in tailoring sensory breaks to each student. “This is a challenge for teachers who are generally unfamiliar with these children that have complex needs that comprise not only developmental but also a wide range of health needs” (Zijlstra & Vlaskamp, 2005).

Eventually, the aim for the cognitive and sensory diet approach is to teach children to use strategies enabling their learning of chosen activities to support themselves (Polatajko & Cantin 2010). Further, once a student fully understands their sensory needs, the end goal is for them to understand how to implement or ask for implementation within an inclusive classroom in order to enhance their academic abilities within the least restrictive environment.

**Summation**

While taking a close examination through the literature, it is believed that sensory integration (SI) is paramount for students with ASD and HFA in the classroom at the primary and secondary level. Each strand of this literature review delved deeply into the history of special education and how educators have evolved over the last few decades, coupled with the history and knowledge of ASD and how HFA is a part of the autism spectrum. A comprehensive summarization of student learning needs according to Ayres (2005) chart provides sound information to support the research in sensory integration at all stages of a child’s developmental beginnings. Lastly, a close examination of what sensory integration is, how it can be included in the American schools and how it is applied in schools’ overseas sheds light on Ayres’ work on sensory integration and how essential it is for students with autism. The limitation of current research into how educators provide sensory integration at the secondary level is apparent in the literature.
Inclusive environments appear to be ubiquitous around the world, but it is very clear that the model varies. It appears teachers who have been properly trained by universities are more familiar and have a deeper understanding of inclusion. The idea of not providing in-service and pre-service teachers professional development courses to prepare, or further their knowledge, for a diverse environment of learners reflects the lack of understanding of diverse learners.

Providing a true individualized education plan that suits the needs of the individual student will make the curriculum easier to access for the student. Sensory integration is heavily researched at the primary level for obvious developmental reasons, but the research must expand to the secondary level as well. Reinson (2012) states, the widespread acceptance of this conceptual therapeutic model as best practice has not been adequately researched. There remains a gap between linking formal sensory assessment practice models with specific treatment protocols and the formal protocols of individualized sensory diet practices necessary for use in robust, empirical research endeavors.
Chapter 3: Research Design

Teaching students with Autism Spectrum Disorder (ASD) and High Functioning Disorder (HFA) can be challenging if an educator does not have the background to understand the diagnosis or the student’s needs in a learning environment. Understanding and implementing sensory integration (SI) in the classroom can help students on the spectrum with accommodating their learning needs. This can also facilitate academic, social, and emotional growth. Because SI is not a colloquially used term in the general education or special education fields, teachers do not know what it is or how it can be beneficial in their classroom. Due to the high demands in the public-school system with standardized testing such as Partnership for Assessment of Readiness for College and Careers (PARCC) and Measures of Academic Progress (MAP), teachers focus their instruction on teaching students to take these high stakes tests often forgetting the differentiation components. Expectations are set high for educators to teach rigorous and challenging curriculum to all students in the school year. Kontovourki and Campis (2010) state, “critics of standardized, high-stakes testing have long cautioned educators and the public about the ways testing shapes teaching and learning” (p. 236). With time restrictions, comprehensive curriculum, and high numbers of students, public school teachers can become overwhelmed with the responsibilities of everyday teaching. Thus, teachers in the public-school environment, may not be prepared to teach with SI due to lack of knowledge, time, and interest.

Socially inappropriate behaviors involving peer or adult interactions may not be seen as an obvious concern. These behaviors may appear as more of an annoyance or misunderstandings. However, without a glaring sign of a sensory processing disorder, educators may find many challenges with students that fit this profile in the classroom. The purpose of this descriptive case study was to describe the experiences of secondary general educators at the public middle
school level who teach students with Autism Spectrum Disorder (ASD) or High Functioning Autism (HFA). Robert Stake’s (1995) perspective of a descriptive case study using the holistic, empirical, interpretive, and emphatic approach will shape the type of questions the researcher plans to explore in collecting and analyzing data. The following research questions served as the foundation for this research:

1. How do general education secondary teachers integrate sensory experiences into the curriculum for students with Autism Spectrum Disorder (ASD) or High Functioning Autism (HFA)?

2. How do teachers describe the benefits of Sensory Integration (SI) for students with Autism Spectrum Disorder ASD or High Functioning Autism (HFA) in relationship to classroom behavior, social experiences and academic performance in the classroom?

Chapter three is arranged in six sections. Section one investigates the research design and the meaning behind why a qualitative approach is the best fit for this study. Section two examines key scholars’ philosophies on various approaches to a case study. Section three explores the researcher’s positionality in the personal and professional lens while comparing previous work environments to current beliefs. Section four analyzes the participants, ethics, and the institutional review board (IRB) qualifications. Section five delves into the procedures which include data collection, sample interview questions, and data analysis. The final section of this chapter states the criteria for quality research and seeks to discover the credibility, transferability, and limitations of this study.

**Research Design**

Qualitative data can be rich in possibilities because it is impossible to believe there is only one perspective constructed from the data (Corbin & Strauss, 2008). There are various ways
to approach qualitative research; it can vary from description, to conceptual ordering, to theorizing. Denzin & Lincoln (2008) define qualitative research to mean different things in various moments. They write, “Qualitative research is a situated activity that locates the observer in the world. It consists of a set of interpretive, material practices that make the world visible” (p. 4). Qualitative researchers study phenomena in natural environments to make sense of or interpret the meanings people bring to them. This approach will allow the researcher to construct their own interpretation of data to make sense of how to analyze data.

One of the advantages of this approach is the close collaboration between the researcher and the participant, while enabling participants to tell their stories (Crabtree & Miller, 1999). A qualitative design is best suited for this research study because interpreting the participants experience as a teacher within their natural classroom environment will allow true meaning and understanding of the teacher and student interaction during a lesson within that specific classroom. The beauty of the qualitative approach is the researcher’s view can be vastly different from the participant’s view of the lesson. This supports a constructivist perspective of the research study. Baxter and Jack (2008) claim that constructivists state that truth is relative and it is dependent on one’s perspective.

When connecting Constructivist-Interpretivist Paradigm to practice, it makes sense to allow a student’s interpretation of a topic, lesson, or sensory integration be his or her own construction of learning. Yager (1991, p. 53) called it “a more promising model” of learning. Yeany (1991, p.1) alluded to Kuhnian’s paradigm shift suggesting that constructivism can lead “to a gelling of existing thought as well as the stimulation of new ideas” (Cobern, 1993). A constructionist view of a profession only leads us to see the practitioners as world makers who are given the tools to impose their images on situations and their personal practices.
professional practitioner is like an artist or a maker of things (Schon, 1987, p. 218). Elkind (2004) argues that constructivism will only be implemented within the schools once the teachers, curriculum, and societal readiness of teaching become a true science before it can be a true profession. He strongly believes constructivism is the only philosophy that will reform education. Constructivism is built upon the premise of a social construction of reality (Searle, 1995).

Although Elkind (2004) strongly believes constructivism is the way to reform education, Carson (2008) deconstructs his work and finds various contradictions. He defined curricular readiness as knowledge of "what, when, and how the subject matter should be taught" and then claimed that "only when we successfully match children's ability levels with the demands of the task can we expect them to reconstruct the knowledge we would like them to acquire" (Carson, 2008; p. 233). This proves to be contradictory because if a true teacher is reforming education by using a constructivist approach, then expecting a specific outcome for a student to acquire is the antithesis of the constructivist objective philosophy. This begs the question that if there is only one acquired view, reality, reason, knowledge or truth, then what is the basis for arguing for any knowledge using the Constructivist theory? Overall, constructivism is a foundational component to a strong case study.

**Research tradition.** The research approach the researcher used was a descriptive case study that explored the context of the environment using a variety of data sources. This data included interviewing general education teachers with varying experiences in years, co-teaching, inclusion classes, and different subject contents to gain a perspective on their teaching experiences and methods. This paradigm “recognizes the importance of the subjective human creation of meaning, but does not reject outright some notion of objectivity. Pluralism, not
relativism, is stressed with focus on the circular dynamic tension of subject and object” (Miller & Crabtree, 1999, p. 10). The meaning of that quote can be interpreted as the truth is relative based on human participants.

**Case Study Approach**

Yin (2009) defines a case as “a contemporary phenomenon within its real-life context, especially when the boundaries between a phenomenon and context are not clear and the researcher has little control over the phenomenon and context” (Yazan, 2015, p. 13). Yin feels strongly that surveys are not capable of inquiring into a case that interests researchers and that researchers are more interested in a comprehensive research strategy such as a case study (Yin, 2002, p. 14). From a Yinian point of view, a case study is an empirical inquiry that investigates the case or cases conforming to Yin’s earlier definition. This also addresses the how or why questions concerning the phenomenon of interest.

Both Robert Stake (1995) and Louis Smith (1978) are also key scholars in case study methodology whose approach differs from Yin’s. Stake writes that researchers should view a case as “a bounded system” with inquiry “as an object rather than a process” (p. 2). Stake conceptualizes a case as a specific, complex, function that is an integrated system that has boundaries with working parts. Further, Stake believes it is highly beneficial to study programs and people and less beneficial to study events and processes which contradicts Yin who believes program evaluations are the best fit method. Moreover, Stakes uses found characteristics to define qualitative research case studies which are: Holistic (researchers should consider the relationships between phenomenon and context), Empirical (researchers base study on observations), Interpretive (based on intuition which is compatible with constructivist
epistemology), and Emphatic (reflect the vicarious experiences of the subjects). The researcher’s study will include Stake’s holistic and empirical characteristics to define the qualitative research.

Merriam (1998) also defines a case like Stake’s view as well. She sees “the case as a thing, a single entity, and a unit around which there are boundaries” (Merriam, 1998; p. 27). Further, a case can be a person, a program, a group, a specific policy or more. This provides a wider audience to represent a more comprehensive list than Yin’s and Stake’s. Merriam believes that as long as a researcher is able to specify the phenomenon of interest and draw its boundaries whatever they will inquire, they will be able to name a case for it. Her definition is much broader than Yin’s and Stake’s and allows for flexibility in truly utilizing a qualitative case study approach to research cases.

To differentiate between case study method from casework, case method, and case history, Merriam puts emphasis on its unique distinctive attributes as follows: 1. Particularistic (focuses on a particular situation, event, program, or phenomenon) 2. Descriptive (rich, thick description of a phenomenon under study) and 3. Heuristic (sheds light on the reader’s understanding of the phenomenon). In summation, Merriam’s approach is about setting up the foundation for a well-defined and structured research methodology to adequately separate from qualitative research methodologies.

A case study method is applicable for this study because it represents an intensive analysis of a single concern with a desire to understand how educators can implement sensory integration at the secondary level in an inclusion environment. The case study method provides rich thick detail from participants’ interviews and classroom observations to allow an in-depth understanding and analysis of Ayres’ sensory integration theory. The intended outcome for this specific methodology was to gain a wealth of knowledge from each interview to find themes of
sensory integration used in the inclusion classrooms to discern how teachers are supporting students with ASD and HFA. A case study shaped the type of questions asked as a result of the in-depth interviews which were used for various purposes that were highly beneficial to the researcher. Open ended questions were asked which elicited a depth of information past yes or no questions and answers. This enabled the participants’ freedom to answer questions in a free flowing conversational manner while allowing the researcher to deeply explore the participants’ feelings and perspectives on the subject. A case study was appropriate to form data collection and analysis because there were various components to sift through.

Stake’s characteristics to define qualitative research case studies are appropriate within this research study because the investigation uses the holistic and empirical characteristics. The holistic approach allows the researcher to consider the relationship between what sensory integration was and how it was or was not applied in the context of teachers’ classrooms. The empirical aspects of this case study allow the researchers to observe and collect classroom data.

**Researcher Positionality: Description and Identity of Perspectives**

In order to examine my problem as a scholar-practitioner, I should be aware of my own biases within my positionality as I embark on this research journey. Parsons (2008) referred to Kincheloe & McLaren, 1994: Maher & Tetreault, 1993, 1998 who stated, “positionality is a concept that acknowledges the complex and relational roles of race, class, gender, and other socially constructed identifiers in being (p. 1129)”. Understanding this definition allows me to view my experiences through a more critical lens to recognize that I am multifaceted and every experience has brought me to fully discern my personal bias within my research going forward.

**Personal school experiences.** As a child, I was very social and active. Often times, my parents would get phone calls or notes sent home about my inattentiveness in class, careless
mistakes on assignments, or my constant social interactions. I interpreted school as sitting still and learning in a traditional classroom and this was difficult for me. Yet, teachers saw that I was not a bad student, however, I was a major distraction to myself and others. For these reasons, I struggled with my confidence in the classroom for several years.

When I was in my senior year of college I sought professional help in understanding why school was still a struggle for me. After attending the campus Psych Associate Center, I was diagnosed with Adult Attention Deficit Hyperactive Disorder (ADHD) and anxiety. At this point, I was about to enter my teacher preparatory master’s program. I felt confused, yet motivated to self-advocate for myself. I had come to a personal and professional juncture where I could choose to embark on my personal journey and truly connect with the non-traditional learners, or become a victim and blame important people along the way for my many mistakes in school. I chose to capitalize on my personal bias to help students who have disabilities learn how to self-advocate and understand there are various ways to learn, view, and apply intelligence in and outside of the classroom.

**Positionality as an educator.** After finishing my graduate studies and earning a dual master’s in elementary and special education, I began my teaching career in a specialized private school for dyslexic and language differenced children in the suburbs of Atlanta, Georgia. There, I taught fourth grade for three years while using the Orton-Gillingham methodology along with various multi-sensory curriculum for reading, math, writing, and other subjects. Samuel Orton and Anna Gillingham collaborated as pioneers in the field of learning disabilities to exam the cause and treatment for dyslexia in the 1920’s. Orton (1937) took the idea of learning through the senses of experiential learning and applied this to literacy.
In the Orton-Gillingham methodology, the instructor’s objective toward multisensory learning is intended to help practicing classroom teachers reach students who may be struggling with traditional curriculum. Even though I used this methodology in my everyday teaching for three years, I was not eligible to apply to the Orton-Gillingham Academy until I had taught 50 hours one on one with a student, 50 hours’ whole group, and had a minimum of ten observations from my on-campus Orton-Gillingham Fellow. Once my requirements were met, I applied to the Academy for the first time in 2012 and my application was deferred due to lack of knowledge and proper application of the method conveyed in my thesis. After taking a year to regroup and accrue more experience in the Orton-Gillingham approach, I reapplied in 2013 and was accepted into the Academy. Because I committed myself to understanding the art of Orton-Gillingham, this truly became the foundation of my pedagogical approach today.

My classroom role as a general and special educator meant I had a responsibility for two associate teachers and no more than 15 students. My role was to delegate and mentor associate teachers who were new to the field and implement the multi-sensory approach within the classroom. I also held all responsibilities such as parent/teacher conferences, grades, report cards, assessments, and the delivery of innovative multi-sensory curriculum. This environment allowed me to grow as a new teacher in the field and provided me with an abundance of experience in integrating a sensory model in the classroom at the elementary level.

While working in this private independent school, I performed under the supervision of an Orton-Gillingham Fellow who observed and edited my Associate Level application prior to being accepted into the Academy. After three years in Atlanta, I took a 3rd/4th grade position at another specialized private school in Washington, D.C. That school had been established and well respected for their specialized education for about fifty years. This school aligned with a
very similar approach to my previous school in which I was able to utilize my Orton-Gillingham knowledge and other multi-sensory curriculum I was familiar with. My role was very similar, I had one associate teacher, a graduate student teacher I hosted as student teacher, a class of 12 learning disabled students, alongside a classroom team with a speech language pathologist (SLP), occupational therapist (OT) and social worker. There, the idea of collaboration, arts, and creative thinking outside of the box was a strong school mission and vision.

Students engaged in social studies by dressing up and acting out important dates in time, then culminated the course with an interactive field trip. Multi-sensory learning and collaboration between team members was not just a method, but a philosophy in this environment. Students with autism and specific sensory needs to sound, taste, or touch, and emotional impairments were able to fully engage in this environment because it was a kinesthetic, interactive, tactile, creative arts school that met the needs of all learners.

As engaging and innovative this environment was for the students, it was not sustainable towards a balanced work and personal life long term. When I left the school in Washington, D.C., I felt drained, yet resilient to seek new opportunities. I quickly became interested in the next adventure and wanted to explore what public school had to offer. Given my prior experiences, my philosophy is strongly suited toward a collaborative approach. I believe all students are the teacher’s responsibility and it is important to have a strong relationship between student and teacher in order to allow students to feel safe and comfortable to learn. I see the general educator and myself as a team in which all students are our full responsibility. Some educators view teaching as an isolated job; this is not conducive for an inclusive environment. In prior environments, it was evident that all teachers collaborated to serve the greater good of all students. This was a fundamental understanding between teachers, families, and administrators.
Having used various multi-sensory curriculum such as Project Read’s Framing Your Thoughts, Story Grammar Marker, Wilson Language Training, Fundations, and being certified in the Orton-Gillingham methodology, I can attest to positive sensory integration within the classroom model. Synthesizing all of my experiences in various environments has proved sensory integration to be powerful and beneficial for special education students. More specifically, I have narrowed my problem of practice on students with autism and how a multi-sensory integrated approach in the classroom produces more time on task and access to curriculum. Finally, I believe through personal and professional learning experiences, I understand the need for more research related to multi-sensory education and stronger student advocacy in the classroom and beyond.

Current beliefs. Teaching with various sensory techniques has been a major part of my teaching philosophy since I started my career in 2011 in a multisensory specialized school. By synthesizing my philosophy and examining my current secondary environment, I have come to realize the extensive amount of sensory integration and breaks I administer and provide for my students is a beneficial piece to my problem of practice. Inevitably, it seemed obvious that this would be the research direction I should take.

Currently, I work in the school system where I was educated. While taking my prior experiences in two private independent specialized schools and applying them to the public inclusive middle school model, I learned to take the mindset of being open minded and understanding that all teachers have various pedagogical approaches and not all teachers are treated equally within a co-teaching model. My first year in the county, fifth year as an educator, I co-taught 7th grade Common Core ELA and math. At present, I co-teach 8th grade Common Core ELA and math.
Before my arrival, my school did not promote sensory diets or integration for students nor was there a place to implement a multisensory curriculum in the inclusion classroom for students who are more visual and kinesthetic. This is due to a lack of understanding about what sensory breaks and integration in the classroom means in supporting the needs of students with ASD and HFA in the inclusive classroom. I had the pleasure of working with the same caseload for two consecutive years. In the 2017-2018 school year, my responsibilities entailed managing 14 Individualized Education Plan (IEP) alongside co-teaching one section of Common Core math, an alternative life skills (ALS) math class, and Common Core English Language Arts (ELA). Also, I co-taught a math seminar with ten students to provide extra math support. There were students on my caseload with HFA who had been put on a sensory diet throughout different starting points between the 2015-2016 and 2016-2017 academic years.

After teaming up with the school Occupational Therapist and Physical Education teacher, and having a firm understanding of the tremendous benefits a multisensory approach can do for students, it appeared logical to include a sensory component in the inclusive classroom special education environment. The Physical Education teacher provided me with a stationary bike, a floor bike and access to the physical education (PE) storage room for supplies. I also have a trampoline, calming jar, a big ball yoga ball, a large resistance band, bubble wrap, rice, floor scooters, theraputty, body sock, large rubber bands with various resistance types, shaving cream, and a bin with smalls gadgets like pipe cleaners, and hand held fidgets. These objects provide sensory input for students who need activity to self-regulate in order to feel comfortable to engage with peers, teachers, and the curriculum.
Research Participants

The participants of this study were educators who were diverse in age, gender, ethnicity, content, and teaching experience. The educational contents range from English Language Arts, Math, History and Science. The purpose was to collect data from teachers on how they interact with students and how students respond to their teaching based on classroom procedures, teaching pedagogy, philosophy, curricula, and overall dynamics of the classroom. Five participants were interviewed in their classrooms. Two interviews with each teacher provided a more holistic understanding of who they were as people, teachers, and how they interact with students with ASD and HFA. The research site took place at a public high school in the Mid-Atlantic states in the U.S. This particular school is placed in a community that is very affluent with involved parents.

Ethical considerations: Recruitment and access. A voluntary recruitment email was sent to the educators in the school building through work email with the permission of the school administrators. Those who were interested in participating in the study responded via email to the researcher. The sampling and criteria consisted of all grades and subjects within the building to get a wide variety of potential participants for the study. Also, participants were informed that there was an option for participants to withdraw from the study at any time during the research process. The researcher concealed the identity of participants and kept all documents, recordings, and electronic files secure in password-protected and/or locked spaces. Further, pseudonyms were applied to secure the identity of participants. These considerations aligned with protocols outlined and approved by the Northeastern University Institutional Review Board (IRB) along with the county’s IRB in which I conducted my study.
With the permission of the teachers, there was a pre-observation to see the teacher’s interactions with students and the overall classroom climate. Then, there was a pre-interview to understand the individual teacher’s philosophy and practice with students with ASD and HFA. At the end of this interview, sensory integrative strategies were given and discussed with each other. Next, a classroom observation took place in which data was collected using the Sensory Integration theoretical framework, classroom protocol, and the sensory strategies for observation to construct data. Finally, a post interview took place to get the reflective piece of each teacher and understand if and how they knew they were or were not implementing sensory strategies to meet the need of their learners. The participants were assured that the observation will be confidential and have no bearing on any educator performance.

**Procedures**

**Data collection.** Once IRB approval was obtained and in accordance with case study methodology, the researcher collected data through interviews and classroom observations. Five participants took part in two classroom observations and two 30-40 minute interviews. The observations were guided by my classroom protocol sheet and the sensory integration strategy sheet. The interviews were guided by questions but the objective was to promote a conversation to extract a deep amount of information. The first interview served as a background of who the participant was as a teacher in regards to students with ASD and HFA within their classroom and to understand what prior knowledge they may have about sensory integration. The participant was given sensory strategies to review, discuss, look over, and keep at the end of the first interview. The answers were recorded on an iPhone voice thread with the permission of the participant. The sample interview questions were as follows:
Sample Interview #1 Questions:

- How long have you been teaching?
- What content do you teach? How long have you taught this content?
- Have you taught another grade/content? If so, what?
- Have you taught in private school before?
- Have you co-taught before?
- How does your teaching philosophy include students with IEPs and 504s?
- How would you describe sensory integration?
- What prior knowledge and/or training have you had in the field of sensory integration in the classroom?

After the first interview, a classroom observation took place by the researcher to collect data on how sensory integration is applied (or not applied) in the classroom environment. While observing the participant’s classrooms, a classroom protocol of targeted interactions, behaviors, and student learning supports were recorded on a sheet to guide the follow up interview with the participants. The second interview was more classroom-centered questions about how a student with ASD or HFA was taught given the classroom environment and curriculum.

Sample Interview #2 Questions:

- Can you describe the classroom lesson that I observed?
- Did the lesson go as you expected?
- If you had to teach this over again, would you make any changes?
- Were you pleased with the student outcomes, why or why not?
- Sensory Integration questions:
  - Prompt: How does SI affect classroom behavior?
• Prompt: How does SI affect academic performance?
• Prompt: How does SI affect social relationships in the classroom?

The interview protocol served as a reference throughout the interviews. While keeping the integrity of a conversation, the questions were expanded as needed for deeper understanding. Moreover, prior to agreeing to the interviews, the purpose of the research was explained so the participants could decide if they wanted to participate in the interview, classroom observation, and follow up interview. While it was important to interview teachers who apply sensory integration within their teaching philosophy, it was equally imperative to interview teachers who may not be familiar with sensory integration. Donmoyer (1975) states, “case study research might be used to expand and enrich the repertoire of social constructions available to practitioners and others; it may help, in other words, in the forming of questions rather than in the findings of answers” (p. 182). In other words, presenting questions that participants may not be intimate with allows for a more enriched repertoire of social constructs to bolster the researcher’s findings.

Donmoyer (1975) explains, generalizability can be reconceptualized depending on the role of the case study. The environment in which the researcher is conducting this study does not teach to a specialized population like other environments. Meaning, it is critical to take inventory of teachers who may not be familiar with this approach in hopes to use the data to enlighten teachers for future classroom experiences.

**Research Participants.** The researcher transcribed the data from the interviews by using a transcribing app called JustPressRecord and collect data from the researcher’s classroom protocol for classroom observations which will enrich the understandings from the interviews. Coding of the data took place by hand and organized information through google docs. In vivo
coding is one way the researcher can truly capture what the participant was thinking and feeling by taking actual quotes and phrases from the interview. By capturing the participant’s feelings and actual words, allows for rich data in terms of keeping the integrity of the interview. Also, pattern coding allowed the researcher to find frequent and/or different themes. Pattern coding was utilized to decipher the various similarities and differences along with the frequency a pattern appears within interviews. The data was reviewed to develop the categories and themes to interpret and make meaning for the study. If there were any misunderstandings between the participant’s answer and the researcher’s question, the researcher engaged in checking with the participant to review the transcribed interview to amend or add to the original answer.

The Sensory Integration theoretical framework and research questions will be used as a lens to provide insight and understanding. Using Creswell’s model, the researcher analyzed the data for larger thematic and potentially overlapping patterns to make sense of the overall cases of how SI is applied in the classroom setting. A preliminary view of the transcribed data was to take a holistic view of the conversation and pull obvious themes or ideas as a general idea. The second view of the interviews included a color coding that sorted through major categories in color which makes the data analysis a more efficient process and more aesthetically appealing to the researcher.

Figure 1. below represents the data collection and data analysis system. This figure is a bottom up approach moving upward. At the bottom is raw data to ensure the data stated was properly collected. Next, the data is reviewed to prepare for analysis coding. This process will help the researcher bring meaning to the data. During the transcribing, patterns and themes will materialize to help simplify the data to sift through the larger meanings of the themes. This is also imperative to ensure the themes are in fact matching the beliefs of the participants
throughout the process. The classroom observational data will be analyzed using Likert scales determining how the teacher is using (or not using) sensory integration within the classroom or with a student.

![Model of data collection and data analysis system.](image)

**Figure 1.** Model of data collection and data analysis system.

**Criteria for Quality Qualitative Research**

**Credibility.** Credibility refers to reliability, trustworthiness, and verisimilitude of the research (Tracy, 2010). Lincoln and Guba (1985) imply good research is and should be dependable. Applying a thick description of research helps paint a detailed picture of the purpose of the study. Meaning, if the description was removed from the research, the audience should be able to decipher the trustworthiness of the data. For qualitative research, credibility is achieved through a thick description, triangulation and crystallization (Tracy, 2010). Crystallization is a
term that relates to the practice of using multiple data sources, researchers, and lenses but is motivated by post-structural and performative assumptions (p. 843). It is also believed by many researchers that the longer a researcher is present and attentive, they are more likely to notice an environment’s culture and value. Good qualitative research delves on a deeper level to explore issues that may be assumed, implicit, and could be second nature to the participants’ common sense.

The protected interviews and open dialogues between researcher and participant determine the credibility of this study. Crystallization was applied to this study by applying interviews between researcher and participants, classroom observations using a protocol, and a researcher journal. Further, researcher bias was acknowledged with a continual reflection on experiences throughout the interview process to allow an open and clear perspective while engaging with participants throughout this study.

**Transferability.** Transferability accommodates the problem of complexity, it still assumes that findings from one setting are mostly generalizable to another setting if both environments are similar (Donmoyer p.185; Eisner & Peshkin, 1990). Transferability will be accounted for in the case study through accessibility and seeing through the researcher’s eyes. A case study allows the researcher to live vicariously through a unique experience and individuals. By experiencing these unique cases, the researcher can understand how to overcome problems caused by the fact that many researchers learn best by modeling and applying the research that can be generalized within various environments. Secondly, a case study allows the researcher to view the world through the participant’s eyes and in the process of how things unfold. When the researcher is able to step outside of their personal bias and step into the mind of the participants, it is more likely to gain a richer repertoire of information. Further, by providing a thick description about the participants
and settings will help paint a clearer picture for the reader to hopefully transfer information to a similar environment. As stated prior, the longer the researcher is present and closely engaged, the more likely the cultural norm and values will be picked up within the interviews and classroom observations.

**Limitations.** Limitations within this study can affect the results. On a micro level, some limitations may be a lack of participants, or participants who may not understand sensory integration could be problematic. This could slow the progress of the study down. Other limitations include student/classroom concerns such as student or teacher illnesses, spontaneous fire drills, or service pullouts from the school psychologist, speech pathologist, occupational therapist, or other service providers, or a concern with the local IRB board. These distractions will affect the researcher’s planned classroom observations of the lesson.

On a macro level, an area of concern includes lack of professional development in sensory integration for teachers. If participants do not understand sensory integration, questions on teacher practice in this area may not be meaningful. As well, if there is a lack of knowledge regarding SI techniques, a potential teacher observation may not yield any useful data on SI.

**Summary**

A case study method can be viewed as a “bounded system” with inquiry “as an object rather than a process” (Stake, 1995). A case study is relevant for this study because of the rich thick detail from participants and the intensive analysis of a single concern with an eagerness to understand how educators implement SI at the secondary level. As a result of applying Robert Stake’s holistic and interpretive characteristics to define qualitative research utilizing case study methodology, the researcher will be able to align findings necessary to highlight the unique
stories and experiences of the participants. This information may help current and future educators to meet the learning needs of students on the spectrum.
Chapter 4: Summary of Findings

The purpose of this descriptive case study was to understand the experiences of secondary general educators using sensory integration (SI) in the inclusion secondary classroom. An inclusion classroom is an all embracing societal ideology involving individuals with disabilities and special education. The idea of an inclusion environment ensures opportunities for students with disabilities to learn in company with non-disabled peers in general education classroom. The primary focus of the study was to understand teaching and learning practices with students with Autism Spectrum Disorder (ASD) and High Functioning Autism (HFA), while observing general education students at a public high school in the suburbs of the Mid-Atlantic. In this research study, sensory integration was generally defined as “the organization of sensations for use that give us information about physical conditions of our body and the environment around us” (Ayres 1979; 2005) and defined by a team of occupational therapists as “a planned and scheduled activity program to meet a child’s specific sensory needs” (Yack & Colleagues, 2002). Knowledge regarding sensory integration teaching practices is expected to inform general and special educators along with administrators at the secondary level. Robert Stake’s (1995) perspective of a case study using the holistic, empirical, interpretive, and emphatic approach shaped the types of questions explored in collecting and analyzing data. The following research questions served as the foundation for this study:

1. How do general education secondary teachers integrate sensory experiences into the curriculum for students with Autism Spectrum Disorder (ASD) or High Functioning Autism (HFA)?
2. How do teachers describe the benefits of Sensory Integration (SI) for students with Autism Spectrum Disorder ASD or High Functioning Autism (HFA) in relationship to classroom behavior, social experiences, and academic performance in the classroom?

**Research Site and Participants**

The research was conducted at a medium-sized (approximately 1,600 students) public high school in a Mid-Atlantic state in the United States. Six teachers were recruited for the study, but only five participated. The sixth teacher consented and discontinued participation for personal reasons. The five study participants have a combined total of 61 years of teaching experience. All of them have spent most, if not all, of their careers at the school where the research was conducted. For the purpose of this study, the high school is named Hudson University High School.

Study participants vary by gender, ethnicity, content, and specialization, and each was assigned a pseudonym to ensure anonymity.

*Elliot:* Elliot is a man in his early 30’s who has been teaching for five years. He has taught math, Algebra 1 and Algebra 2 at Hudson University High School all of those years. Elliot appeared very engaged with the curriculum and had a strong passion for math. Two observations of a class of students who were either repeating Algebra 2, needed the credit to graduate or were underclassmen (9th graders) taking the class for the first time were conducted. The students were 9th-12th graders with varying abilities, motivation, and passion for math.

*Olivia:* Olivia is a woman in her mid to late 30s who has been teaching science, primarily biology, for twelve years; all of those years at Hudson University High School. Olivia appeared to respect and understand her students, was aware of her students’ needs and abilities, and catered her class to meet to their academic, social, and behavior needs. She implemented,
scheduled, and planned various sensory strategies throughout her teachings. The students were primarily 10th graders with varying abilities, motivation, and knowledge.

**Alex:** Alex is a woman in her late 30’s who has 14 years of teaching. She has taught a range of sciences including, forensics, biology GT (gifted and talented), regular biology, and earth science, at Hudson University High School for 13 years. Alex’s class were 9th graders with varying abilities, motivation, and passion for earth science.

**Melinda:** Melinda is a woman in her early 40’s who has been teaching special education for 18 years. She spent 13 years in the county where the research was conducted and 12 years at Hudson University High School. Melinda is a special educator and has co-taught content ranging from resource math for 8th graders to Geometry and American Government for high schoolers. Melinda’s class were a range of 9th-12th graders with varying abilities, motivation and a passion for government.

**Casey:** Casey is a woman in her mid to late 30’s who has been teaching for 12 years; 11 of those years at Hudson University High School. This is Casey’s ninth-year teaching English 10 GT (Gifted and Talented) and she has been teaching English Honors to 9th and 10th graders for several years. Casey is working towards a doctorate and hopes to graduate in the spring of 2019. The class were all 10th graders with a similar academic drive and motivation to succeed, and includes students who have more sensory needs than others.

**Data Collection Procedures**

Six Hudson University High School teachers consented to participate in the research study. A recruitment email was disseminated to a small group of teachers suggested by the special education team leader at Hudson University High School. After one week, only one teacher had expressed an interest in participating. Eight weeks later, the same recruitment email
was disseminated for a second time. A special education teacher contacted me to say she wanted to participate in the study and discuss logistics in person. A meeting was arranged where the teacher offered to personally recruit other teachers she felt would absolutely want to participate. This was the start of the true recruitment process and resulted in a total of six teacher consents to participate. The next step included a pilot interview with each teacher to review the interview questions, protocol, and time for clarifying questions.

Each study participant received two observations and two interviews. The first observation was to witness the teachers’ interactions, awareness, and understanding of their students and to get a full picture of the dynamics of their classrooms. The purpose was to take inventory of the teaching style and how the content was delivered, factoring student demographics, and to see if there were any sensory strategies integrated into the classroom before the interview. The initial interview was an inventory assessment to determine how many years they taught, if they had ever taught in a private school setting, and their teaching philosophy. Teachers were questioned about their prior knowledge, if any, of sensory integration and were subsequently provided with sensory strategies they can implement in their classrooms. Melinda, the special educator, and Casey, the English 10 GT teacher, were the only teachers who had participated in training on sensory integration strategies. Melinda explained that she’d worked in a group home for adults living with autism and she was able to learn how to interact and help their quality of life with sensory integration. Casey discussed the various sensory tricks she casually incorporates into her classroom to make everyone feel comforted and accepted.

The purpose of the second observation was to take note of any sensory integration strategies that were described in the first interview and how they were implemented. The second interview provided clarity about what sensory integration should look like in the classroom based
on the synthesis of the individual teaching philosophies and data from the second observation to confirm a thoughtful and intentional implementation of sensory integration at the secondary level. In conjunction with the second interview, the second observation illustrated a clear description of teacher awareness with students and how content was delivered given the needs, abilities, and motivation of the learners. The final interview conducted reviewed the second observation and revisited the first observation if necessary and a final closeout debrief and final thoughts. This interview was a reflection on the lesson(s) observed to seek introspective feedback on each teachers’ self-assessment of their lesson and how or if they would change aspects of it to include sensory strategies. The second part to the final interview focused on reporting sensory strategies observed and seeking teacher feedback on these practices in the classroom.

Data Analysis

Using Creswell’s (2009) model, data were analyzed for larger thematic and potentially overlapping patterns to make sense of how SI is applied in the classroom setting. Creswell’s model employs a bottom up approach where at the bottom is raw data. Next, the data is reviewed to prepare for analysis coding. This process helps bring meaning to the data, allowing for the researcher to access several themes.

Each interview was recorded on a transcribing iPhone app called “JustPressRecord”. Several of the interviews did not capture every word or words were incorrectly transcribed (example: co-teach would transcribe to contour or sensory integration would transcribe to sense gration). All interviews were thoroughly reviewed to ensure all information was properly communicated and documented for further analysis. Data were analyzed and coded using charts
organized by themes found in interviews and observations throughout the study. Classroom protocol data and transcribed interviews were also coded using thematic charts.

The first research question examined how general education secondary teachers integrate sensory experiences into the curriculum for students with Autism Spectrum Disorder (ASD) or High Functioning Autism (HFA). Findings from analyzed data illustrate that a variety of sensory strategies were being employed in the teachers’ classrooms. The strategies most widely used by secondary teachers were the self-regulation/organization strategies. Self-regulation can be defined in the most basic sense as controlling one’s behavior, emotional, and thoughts in pursuit of long term academic goals. In short, self-regulation refers to the ability to manage disruptive emotions and impulses. Organization strategies can be defined as a way to bring structure and order into a classroom setting for students to anticipate major changes without behavioral or emotional disruptions.

Examples of what these strategies look like when integrated into a classroom setting are creating and implementing a daily class routine, communicating when there is a schedule change, creating a signal for students who get overwhelmed or need a break, and allowing or providing chewing gum for students. Eighty percent (4 out of 5) of the teachers in the study used self-regulation/organization as sensory strategies. Physical comfort strategies can be implemented by using alternative seating such as a wiggle chair, exercise ball, or standing desks, exercise bands attached to the legs of a chair, handheld fidgets, and by encouraging comfortable positions. This strategy was observed in forty percent (2 out of 5) of the teachers in the study. And lastly, classwork/testing sensory strategies were reflected by both the teacher and the students. Classwork/testing can be implemented through reducing handwriting (fill in the blank questions, allowing extra time for writing, use of electronics, etc.), minimizing use of visual
input on a page, or providing colored overlays for reading to minimize distractions. Student-led implementation of this strategy can be using a folder to create a private cubicle to minimize distractions, pencil grip, slant board, text to speech software, highlighter or sticky notes, listening to music to focus and self-regulate. Sixty percent (3 out of 5) of the teachers used classwork/testing sensory strategies.

Only one of the five teachers did not demonstrate intentional sensory strategies within the classroom environment. After two observations, it became apparent that students were implementing their own sensory strategies that were counterproductive to the classroom learning environment such as aimlessly walking around the room, eating under desks, and on electronic devices during instruction. Note that "routine" is used to identify when a standard classroom self-regulation strategy was observed; "communication" is used to identify when a verbal self-regulation strategy was observed. A detailed breakdown of sensory strategies observed during the second observations are described in Table 1 below:

Table 1

A Detailed Breakdown of Sensory Strategies Observed during the Second Observations

<table>
<thead>
<tr>
<th>Teacher</th>
<th>Sensory Strategies Implemented</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elliot (Alg 2- mix 9th-12th)</td>
<td><strong>Physical comfort- 0, Self-Regulation- 0, Classwork/testing- 0</strong></td>
</tr>
<tr>
<td></td>
<td><em>None to report</em></td>
</tr>
<tr>
<td>Olivia (Biology 10th)</td>
<td><strong>Physical comfort- 0, Self-Regulation- 8, Classwork/testing- 1</strong></td>
</tr>
<tr>
<td><strong>Self-Regulation:</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Drill on board with directions - routine</td>
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<tr>
<td></td>
<td>- “We will come back together as a class in 5-6 minutes, so collaborate with your groups”- communication</td>
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<tr>
<td></td>
<td>- “It has been about 2 minutes. Now you can collaborate with your table and make a prediction”- communication</td>
</tr>
<tr>
<td></td>
<td>- “You have 2 minutes to make sure you’re updating your notebooks”- communication</td>
</tr>
</tbody>
</table>
- “Alright, let’s come together, if you can please end your conversations” (3 times this was said) - communication, she also said this during the first observation
- Communication about what the students are completing today. Explained verbally - communication
- “Respectful and mindful to read, to have a quiet environment, so let’s read quietly” - communication

**Classwork/testing:**
- While teaching, there are notes on a worksheet that are partially filled in as she teachers, students appear to take notes
- Teacher asked students questions about predictions, using visuals while taking students inventory, students were engaged

<table>
<thead>
<tr>
<th>Melinda (American Government 10th)</th>
<th>Physical comfort- 1, Self-Regulation-2, Classwork/testing- 0</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical comfort:</strong></td>
<td></td>
</tr>
<tr>
<td>- While doing independent work, 4 students had headphones on and appeared to be working and on task</td>
<td></td>
</tr>
<tr>
<td><strong>Self-Regulation:</strong></td>
<td></td>
</tr>
<tr>
<td>- Within the first few minutes CNN video warm up (this was done in the first observation) - routine</td>
<td></td>
</tr>
<tr>
<td>- On the board, “American Government- Today’s topic- The Legislative Branch” - routine/communication</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Alex (Earth Science 9th)</th>
<th>Physical comfort- 0, Self-Regulation- 1, Classwork/testing- 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Self-Regulation:</strong></td>
<td></td>
</tr>
<tr>
<td>- Warm up on board when students first walk in (witnessed first and second observation) - routine</td>
<td></td>
</tr>
<tr>
<td><strong>Classwork/testing:</strong></td>
<td></td>
</tr>
<tr>
<td>- A visual of a worksheet the teacher was collecting for the next activity was put on the overhead for all to see</td>
<td></td>
</tr>
<tr>
<td>- When reviewing data whole group, teacher asked students the data they collected and she typed data on computer and displayed while they listened and watched</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Casey (English 10 GT)</th>
<th>Physical comfort- 2, Self-Regulation-4, Classwork/testing- 1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical comfort:</strong></td>
<td></td>
</tr>
<tr>
<td>- Student sat in comfortable movable chair during student/teacher conference</td>
<td></td>
</tr>
<tr>
<td>- Students wearing headphones to focus and write their stories</td>
<td></td>
</tr>
<tr>
<td><strong>Self-Regulation:</strong></td>
<td></td>
</tr>
<tr>
<td>- “We’re going to come back together in about 5 minutes” - communication</td>
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</tr>
</tbody>
</table>
- Teacher took inventory of how students felt about the assignment and allowed them to decide if they should move onto the next topic or continue providing writing time - communication
- “I have more students to meet with but I can’t do that if you aren’t getting work done” - communication
- “Let’s make sure we are working” - communication

**Classwork/Testing:**
- Students use chrome books that have a touchscreen that swivels and the entire computer can bend to fit a student’s comfort needs.

The second research question examined how teachers describe the benefits of Sensory Integration (SI) for students with Autism Spectrum Disorder ASD or High Functioning Autism (HFA) in relationship to classroom behavior, social experiences and academic performance in the classroom. The research participants provided a variety of answers that mostly corroborated what was witnessed during the two observations. For example, Elliot, whose observations identified that no sensory integration strategies were being implemented, stated that he was not aware that a student was sitting in the wrong seat and was on his phone listening to music during most of the lesson. Incorporating all aspects of the teacher interviews and observations added clarity to which teachers were reflective in thinking about how they could improve their classroom environment.

When asked how SI benefits students with ASD, HFA, and general education students’ behavior, social interactions, and academic performance, a wide range of answers was received. Both Olivia and Casey discussed sensory integration in both interviews and there were also several strategies implemented during both observations. The next section includes detailed descriptions of four teachers who demonstrated best sensory strategies and awareness of their classroom climate, ordered from strongest to weakest.
Sensory Breakdown: Teachers and Environment

**Olivia, Biology 10.** She knew her learners and she inspired the students to learn and retain information by allowing them to collaborate in various ways. Olivia also respected that the learners are high school teenagers and understands that they can be chatty and sometimes off task. However, she provided a structure with boundaries that allowed students to feel respected and willing to engage in the material even if they weren’t strong in the content or had a desire to enjoy biology. Olivia was completely aware of her actions and her students’ actions throughout both observations and interviews. When focusing on the impact of sensory integration of her students’ behavior, social experiences, and academic performances, Olivia was quick to answer with a definitive “absolutely”. Delving into the how, Olivia stopped and reflected on the last lesson observed and provided a more descriptive answer about the benefits of sensory integration in her class. Olivia believes as a scientist, collaborating with peers or other scientists is the best way to learn, grow, and understand the content:

…and you know, like scientists share data and collaborate and so working together and working through it, you're struggling with something they can ask each other questions. But when it's time to come back together, I tell them I'm talking if we're going over something or if one of your classmates is talking, then be respectful of that. Olivia provided great insight on her application of sensory integration within her classroom implicitly and explicitly. She commanded a presence that students respected and appeared to want to learn and be in her class.

**Casey, English 10 GT.** She spent one year in an urban setting at a visual arts school where she taught integrated English for 10th graders. Casey also has experience in the private school setting where she taught summer school at a Jesuit school and did a long-term substitute
position at a parochial school in an urban setting. Casey had a good rapport with her class where an atmosphere of mutual respect was observed. Throughout the final interview, a comprehensive picture of who she is as a teacher based on conversation and observations emerged.

During the second interview, Casey provided an example of how she changed her plan for her class within a few minutes of receiving feedback from them. She expressed that although she is a meticulous planner and maps out what she wants to cover throughout the entire quarter, she builds in flexible days for students to catch-up on work, which was observed during the second lesson. Casey is a student-centered teacher which means that she intentionally reserved days for students to complete work and is open to shifting the established plan to cater to their needs. Casey explained that she has taught grade-level English 10 along with Honors. However, she takes a more mature approach in trust and expectations with her Gifted and Talented (GT) students. Casey states:

But I really push with GT and I chat with honors as well but it's a different way. But with GT to me, they should be at that level that they should have some type of self-motivation and self-advocacy and when they said, ‘I need this time’ that said something to. It wasn't complaining about a due date or push it back, it was like a legitimate ‘I really need this and then I have questions’. I didn't have a single student across the entire day when I gave them the time, wasted. I didn’t have any students playing a game. Now, there was some chatter --but it was productive chatter.

Casey connected her teaching approach to sensory integration and illustrated how she meets the needs for all learners. She also provided her thoughts on sensory integration at the social, academic, and behavior level. Casey explained how she feels that for most students, there is a stigma attached to using technology to enhance the learning experience; most students will ask if
they can listen to music while working. When discussing physical sensory breaks, Casey pointed out the need for students to have movement breaks or a "pick me up”. Providing lotion or hand sanitizer, the option to get a drink, chew gum appropriately, or to walk around for a minute are all known sensory options within Casey’s classroom. Data collected from the two observations and interviews show that the students in this class did not abuse these strategies. She further explained that these casual strategies do not bring attention to students and it look like a socially appropriate activity within a classroom.

Casey applies sensory strategies in testing environment such as offering a small piece of candy to students after completing a hard assessment. In her second interview, Casey shared that during her PhD program she took a brain theory class and learned that the brain responds to a positive reward after finishing a difficult task by making the experience more positive which encourages the individual to try again next time, even if the results weren’t what was expected. She explains this further:

It’s the same sort of thing when we bring out crayons. I always have them in bins, and when I open it, it's a smell of crayons that brings in a happier time and I've never thought of this until I took my brain theory class. I used to scent my room before we had the environmental people---I used to scent the room based on the season. I had those glade things and so like in, like when they first came back I had like more like a tropically sort of scent and it made them think of summer and it was happy and then we transition to fall and it was cinnamon because cinnamon brings that warm home vibe. I just try to make everyone comfortable in the room.

Casey discussed her knowledge of sensory integration at great length and provided a substantial amount of data.
**Alex, Earth Science 9.** Alex understand the classroom dynamics and personalities of her students and other teachers, however, strict boundaries and consequences for inappropriate actions were not put in place and/or were not communicated consistently. Alex was laid back with a very high tolerance for what could appear to be chaos to an outside observer. Alex was aware of her student abilities and behavior issues but also expressed that she did not feel she had the best support staff in the room to help implement sensory strategies in ways to get her classroom management under control during lessons. Alex elaborated on how the second lesson observed went as expected. She predicted there would be a little chaos because the lesson required students to do a lab outside and on that particular day it was cold and windy. She also anticipated their attention span would not last long and that transitioning from the classroom to outside back into the classroom would be a challenge. While Alex’s awareness of the student’s abilities was accurate, it did not match her awareness of the task required.

Alex was asked how she believes sensory strategies affect the behavior, performance, and social relationships in the classroom. She explained that using a lot of visuals and modeling usually helps behavior because students are able to see what they are asked to do which hopefully leads them to be more on task. Alex admitted that she should have had a visual of the lab on the board to show the class what was expected. When reflecting on how self-regulated communicative strategies can improve the academic performance, behavior, and social relationships in her classroom she said:

Well I think if they're paying attention or focusing, their academics are going to be good. Since science has a lot of hands-on stuff that we do, most of the activities we do you're doing in a group. It does get them to interact with other people in the class and maybe they wouldn't have done before. And when we do a lot of hands-on things I can see if
they're doing it easier like more quickly or I can correct them or tell them they're going to
do a good job. So, I think that it does help with like interacting with students more and
more hands-on.

Alex provided insightful feedback during interviews and her reflective components became
pivotal in data collection because she was more reflective once questions were asked and was
prompted to think about the lesson observed.

**Elliot, Algebra 2.** Elliot is very engaged with the curriculum and has a passion for math.
He is a fifth-year teacher and all of his years have been at Hudson University High School.
However, given the demographics of the class (juniors and seniors who repeated the class to
graduate, and an occasional freshmen) very little motivation and focus on achieving the highest
grade possible was observed for most of the students. Interviewing Elliot proved challenging
because most of his answers included a lot of math jargon and explanations not applicable to the
research questions. At one part of the interview he states, “-- You know something more
complicated is with the binomials and this but-- but this is kind of a refresher course for them--”.
When clarification about what a refresher course looked like was sought, he explained that he
has one senior in his class but then continues to say:

No, so one of the things that’s going on with that. But perhaps I’ll keep it more formally,
but with scheduling they organized all the seniors in a designated Algebra 2 course, that
runs at a slightly slower pace from the rest of the Algebra 2 reg. teachers. It just focuses
more on refreshing so they can practice more of the fundamental concepts they need.

It was difficult to understand if his class was the refresher course because there was only one
senior to report in his class or if there was some other explanation.
On both observations of Elliot’s class, there were several off-task activities occurring around the room that did not appear to be a part of the lesson. I also witnessed some students using headphones while instruction was happening; two of the headphone students were in the back of the room taking a test and one student was not testing. Based on where he was sitting and the peers around him, the non-testing student should have been engaged in instruction. This student is addressed later in this section.

When students were engaged, it was only for short periods of time and Elliot demonstrated a lack of awareness of the classroom environment. In fact, he sat in the front of the room while using the projector, talking to the class with his head bowed and making very little eye contact. Elliot also initiated the use of participation sticks to call on students but would go back to talking animatedly to his projector before allowing the student to speak. When inquiring if Elliot was pleased with student outcomes, he immediately said yes but then continued to contradict the positive outcomes with a negative explanation. He disclosed that several students were struggling because a few weren’t paying attention or some were not putting in the effort. He continued to explain that Algebra 2 builds on prior knowledge and this is where students begin to see the importance of independence and applying higher level thinking. Elliot stated that the students who weren’t maximizing their potential will eventually realize the consequences of their actions, sharing, “it’s going to smack them in the face.” Elliot’s explanations were very contradictory. He initially stated that the students were working really hard. He then goes on to state that although he was aware that most students were not putting their best foot forward, he took the approach that they are mature enough to realize things will “smack them in the face” and when reality hits, they will pay attention. During the second interview when Elliot was asked how he differentiates for learners who may not understand the material he stated, “So, my-- I'm
very much, one of my biggest things is that I am a very adapting teacher. If there’s a piece of something I don’t really like, I’m going to *snaps fingers* change it right away.

Although in theory, he understood how to differentiate by changing a lesson on the spot, connect with various learners by building relationships, and even discussed how a TedTalk inspired part of his master thesis on his teaching philosophy. It was glaringly obvious that a clear understanding of what independence and structure should look like was lacking, particularly to the students who may have already seen the material and weren’t motivated to see it again.

Throughout Elliot’s interviews, it was difficult to obtain a direct answer to questions which always circled back to math with mathematical vocabulary, phrases, explanations, and curriculum sequence. Elliot was clearly very comfortable discussing anything math related and was excited about the curriculum. When inquiring about a few sensory strategies potentially observed, it became clear he did not know what that meant. He was confused when asked about how he felt sensory strategies can improve behavior, social relationships, and academic performance:

Uh, I’m sorry how does which thing affect my classroom behavior? Once reiterating what sensory strategies may look like, circling back to the examples during the first interview, Elliot articulated:

Oh sure, I think a lot of -- if students can understand the material and make a connection to it, and kind of get hooked in, and can follow it then it’ll help and I think you’ll have less behavior issues.

While discussing sensory integration within Elliot’s classroom, the non-testing student wearing headphones came up. Elliot explained that he does not have a problem with students wearing
headphones, and clarified that he was not aware that a certain student was not in his correct seat and had headphones on during the lesson.

**Discussion of Themes and Sub-Categories**

Several themes emerged from the data collection which helped formulate the basis of the coding strategy implemented for data analysis. Several additional themes emerged while coding the data which resulted in the creation of a new theme or category. The following themes were finalized: Academic, Academic/Personal, Sensory, Awareness, Interaction, and Behavior. Table 2 describes themes and provides an example of that theme from the research:

Table 2

*Themes and an Example of the Theme*

<table>
<thead>
<tr>
<th>Themes</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Academic:</strong> Any sort of curriculum connection or topical discussion, statement, or observation.</td>
<td>In American Government, in both observations the students start off by watching CNN student news for the first 10 minutes to drive the class discussion. - Melinda, American Government</td>
</tr>
<tr>
<td><strong>Academic/Personal Connections:</strong> When a teacher is making a connection outside of the curriculum to better help a student understand the concept.</td>
<td>“Think about—think about a football field. They start a line of scrimmage. They run about 10 yards and have to drop back 3 yards and then they pitched the ball two yards forward, I try to get them to think --I try to build the context in something they care about and try to couch problems that way”. - Elliot, Algebra 2</td>
</tr>
<tr>
<td>“Have you ever used a strainer when making pasta? The glucose is small so it can go through those holes” -Olivia, Biology</td>
<td></td>
</tr>
<tr>
<td><strong>Sensory:</strong> Sensory strategies that are directly used from the sheet provided during the first interview, or any prior knowledge of understanding sensory integration for students or people with autism.</td>
<td>“Sensory integration. It's been a long time since I've thought about sensory integration because it reminds me of students who are autistic. But I did work at autism center— for a group home. It was called Autism Society in Raleigh, North Carolina and they gave me some phenomenal training”. - Melinda, Special Educator</td>
</tr>
<tr>
<td></td>
<td>“Um, I definitely do the alternative seating I know that some kids like to stand up while they’re working or they have a hard time just staying in one spot. So, I will try, in the past,</td>
</tr>
<tr>
<td>Awareness: How much the teacher is aware of student behavior and understanding of the lesson whether it is covert or overt.</td>
<td>I’ll have kids if they’re working on something and it’s more individual and they’re at a lab table or the kids that seem to just get up a lot. I have them normally in like the back of the room here where they can move around and it doesn't distract everybody”. –Alex, Earth Science</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Student reading and playing games on phone for about 11 minutes during class without any redirection. No redirections or consequences put in place. –Alex, Earth Science</td>
<td></td>
</tr>
<tr>
<td>Student sitting in the front of the room walks to the back of the room to grab a Qdoba bag and begins to open the container and eat in the back of the room. Then, walks to the front of the room to sit. 10 minutes later, gets back up to bring the Qdoba bag to his seat and continues to eat in front of the room next to the teacher while teaching. No redirection or consequences were put in place.</td>
<td></td>
</tr>
<tr>
<td>“--- over the summer I just came across this video that talked about why I flipped my classroom and students would always ask me when they would come in, ‘are we taking notes today?’ and that’s when I would have my most disruption because people would be finishing early or they’re getting distracted. It allows them to pause the video and go back. And I tell them, when they come to class I don’t expect you to know everything. It’s like you're coming in and now you have that background and then today's lesson is going to build on that”. - Olivia, Biology</td>
<td></td>
</tr>
<tr>
<td>Interaction: How often did the teacher interact with the students to check in to know if they needed extra support or understood the material. Also, teacher/teacher interactions (co-teaching) either in observations or interview.</td>
<td>“This year I do not have any co-teachers though in the past I would say I've had for five co-teachers as well as I've had several para educators that have worked with me and one para-educator who transferred or became a co-teacher during the year when he finished his masters that was four years ago”. - Casey, English 10 GT</td>
</tr>
<tr>
<td>“A student’s head was down with his hood up for about 2 minutes. Teacher didn’t say or do anything to acknowledge this.</td>
<td></td>
</tr>
<tr>
<td>Behavior: This is gauging student behavior (positive or negative) and how the teacher responds to it.</td>
<td>At 1:52 teacher left room, I heard a kid say, “cockroach” and other students continued to work. The teacher left for about 2 minutes and she came back calmly saying, “It’s okay” <strong>later found out it was a stink bug she removed outside</strong> There were no obvious disruptions from the students or from the assignment.</td>
</tr>
<tr>
<td>Example: While the teacher was providing one on one support, three students were talking and engaged with one</td>
<td></td>
</tr>
</tbody>
</table>
another very loudly and it did not seem topical about the math work they were supposed to be doing.

Example: While students were supposed to be doing group work, one young man was doing push-ups in the front of the room while another young man from another group was encouraging him from across the room with athletic body language and movements to do more by giving him a flexed bicep motion and a thumb up to continue. Two teachers were facing in the direction of this student and no teacher redirection or consequences were addressed.

Summary

The purpose of this explanatory case study was to understand the experiences of secondary general educators using sensory integration in the inclusion secondary classroom. This study focused on the experiences of five teachers in a secondary public high school implementing, understanding, and learning about how sensory integration impacts their classroom behavior, student’s social interactions, and academic performance. Two science teachers, one math teacher, one English teacher, and one special education teacher provided information about their experiences with sensory integration and how they implement strategies in their classroom.

Chapter four includes themes from this study from several coding cycles. Ten pre-observation and one cycle of observations and ten post interviews and a second cycle of observations were coded. Data were compared between the first round of interviews, the first round of observations, then the second round of interviews and second round of observations. Data were then synthesized between the pre-interview and first observation and the post interview and final observation. This process helped fine-tune recurring themes throughout the data. Each participant in this study expressed their thoughts, knowledge, and inquires on sensory integration in their individual classrooms. In this research study, it was apparent that some
teachers were intentionally implementing a planned and scheduled activity, approach, or a system to meet the students’ specific sensory needs. Other teachers were not attentive to students’ needs or realized they should have implemented more to help the structure of the class.
Chapter 5: Discussion of Findings and Implications for Practice

The purpose of this descriptive case study was to understand the experiences of secondary general educators using sensory integration in the inclusion secondary classroom. The primary focus was on teaching students with ASD and HFA while observing general education students at a public high school in the suburbs of the Mid-Atlantic. In this research study, sensory integration was generally defined by A. Jean Ayres, a founder of sensory integration, as “the organization of sensations for use that give us information about physical conditions of our body and the environment around us” (Ayres 1979; 2005) and defined by a team of occupational therapists as “a planned and scheduled activity program to meet a child’s specific sensory needs” (Yack & Colleagues, 2002). Knowledge generated is expected to inform general and special educators along with administrators at the secondary level.

Chapter five will delve into the research design and a discussion of the limitations of the study, along with the overview and discussion of findings. Exploring the credibility, trustworthiness and implications for future studies will be explored throughout this chapter as well. Lastly, recommendations for future practice will conclude this chapter.

Research Questions

Central Questions:

- How do general education secondary teachers integrate sensory experiences into the curriculum for students with Autism Spectrum Disorder (ASD) or High Functioning Autism (HFA)?

- How do teachers describe the benefits of Sensory Integration (SI) for students with Autism Spectrum Disorder ASD or High Functioning Autism (HFA) in
relationship to classroom behavior, social experiences and academic performance in the classroom?

Sub Questions:

- How does SI affect classroom behavior?
- How does SI affect academic performance?
- How does SI affect social relationships in the classroom?

Research Design Review

A case study method was applicable for this study because it represented an intensive analysis of a single concern with a desire to understand how educators can implement sensory integration at the secondary level in an inclusive environment. The approach taken with a case study allowed for rich thick detail from participants’ interviews and classroom observations which inevitably allowed an in-depth understanding and analysis of Ayres’ sensory integration theory. The intended outcome of gaining a wealth of knowledge from each interview and observations to find appropriate themes of sensory integration used in the classroom was achieved. A case study allowed for questions to be open-ended and flexible for an in-depth interview. Open-ended questions were asked which elicited a depth of information past yes or no questions and answers. At times, some teachers simply answered the question asked in depth while others moved the conversation in another direction. A case study was appropriate to form data collection and analysis because there were various components to sift through such as classroom observations, lengthy interviews and a researcher’s journal which is explained more in depth in chapter three.
Limitations of the Study

Limitations within this study can affect the results. One limitation was not all participants understood sensory integration and how it could be properly implemented in their classroom environment. This became evident by the end of the study once data were analyzed. A second limitation within this study was the trustworthiness of teachers’ responses in interviews and if they aligned with their observations. With one teacher, what was stated in the interview was not necessarily present in the observations. Further, research was conducted at a high school that shares a parking lot with the middle school where the researcher currently works. Because 90% of the students from that middle school attend the high school across the parking lot, there were former students the researcher taught previously in various classes observed. Having known some of the students, needs, personalities, and abilities provided intimate insight for a better understanding of the teacher interactions with the students. This did not allow the researcher to be 100% neutral or unbiased.

Discussion of Findings

Donmoyer (1975) states, “case study research might be used to expand and enrich the repertoire of social constructions available to practitioners and others; it may help, in other words, in the forming of questions rather than in the findings of answers” (p. 182). Presenting questions that participants may not be intimately familiar with allows for a more enriched repertoire of social constructs to bolster findings. A close examination of the literature suggests that sensory integration (SI) is paramount for students with ASD and HFA in the classroom at the primary and secondary level. A comprehensive summarization of student learning needs according to Ayres (2005) chart provides sound information to support the research in sensory integration at all stages of a child’s development.
The limitation of current research into how educators provide sensory integration at the secondary level is apparent in the literature. This study supports current literature and proves that while some teachers are implementing their own sensory strategies it is possible that this is not an approach all teachers know, understand, and use at the secondary level or across content. Data analysis highlighted that accommodations are context dependent. Accommodations are specific to the teacher, content, and students. Further, this case study can’t be generalized across all contexts because this study was specific to a certain school, specific teachers, and an individual student population. That said, this study does provide a wide range of knowledge in understanding how sensory integration is perceived, viewed, and implemented by the participants within their classrooms.

There was strong evidence of sensory integration strategies in Biology and English 10 GT. Both participants understood how sensory integration improved the quality of learning for most, if not all students. In other classes, the lack of sensory integration and strategies was manifested in undesirable behaviors. Findings point toward sensory integration having an overall positive impact on students’ attentiveness and time on task even though classes observed for the study did not have students overlapping in various contents, meaning that there the same students were not observed in multiple classes.

There were a total of six themes used throughout the data analysis. Several themes emerged from the research questions to help code the data when it was time to analyze. The themes are as follows: Academic, Academic/Personal, Sensory, Awareness, Interaction, and Behavior. As previously stated, Ayres (1979, 2005) described the critical nature of the first seven years in a child’s sensory integration. Children who receive significant sensory integration within their environment for the first seven years of their lives, exhibit minimal negative behaviors in
school and can improve social interactions. Ayres (2005) believes that organization through adaptive responses is vital to a child’s development. Yack & Colleagues believes, “Engaging children in sensory experiences on a regular schedule can help them focus, attend, and interact” (p. 73). This was absolutely evident throughout the study in various classes. Fewer behavior issues and more time on task were witnessed when teachers implemented various sensory strategies which is grounded in the researcher’s theoretical framework from Ayres (1979, 2005).

Some researchers (Borek & Thompson, 2003; Kavenaugh, 1991; Shaywitz, 2003) posit that various neurons in the brain only fire when multiple sensory pathways are stimulated and utilized. All people have a cognitive filing architecture used for storage and retrieval of thoughts, ideas, and concepts. During the observations, there were a few participants who used minimal sensory integration or strategies. This resulted in more behavioral issues and less time on task. Sensory integration does not just benefit students with ASD or HFA; the student range is very wide. The types of students who benefit from sensory diets on a daily basis include students with language impairment, central auditory processing disorder, dyslexia, Asperger’s syndrome, attention deficit disorder, dyspraxia, development coordination disorder (DCD), and emotional behavior disturbance (EBD). Multisensory learning (MSL) is a natural way to teach students that everyone gathers information in various ways and MSL utilizes multiplicity sensory pathways. The more intensely the sensory pathways are used, the more efficiently and effectively information is retained (Montessori, 1967, Orton, 1937). Findings from the research demonstrate that teachers who provided a scheduled and consistent sensory break or strategy allowed more time on task with fewer behavioral distractions. When sensory breaks or strategies were inconsistently implemented or not implemented at all, this allowed for less time on task, more disruptions, and behavioral distractions. Moreover, when teachers acquiesce to a consistent
scheduled sensory breaks or strategy, secondary students are able to access curriculum with more
time on task and fewer behavioral concerns.

**Credibility and Trustworthiness**

Techniques were implemented to ensure that data were collected without bias and true to
what the participants had to say. The researchers ensured that with every interview, there
weren’t any leading questions beyond what the participant knew about sensory integration.
Depending on the interview, some participants required further questioning or restating of
questions to provide an answer in regards to what sensory integration looked like through the
participant’s perspective. Also, if the participants inquired about how they could implement
sensory strategies, the researcher referred to the strategy sheet to encourage the use of the
strategies offered. All data collected during observations were purely from an outsider’s
perspective looking in and all data collected during interviews were prompted with appropriate
questioning to lead the participant to their own findings or understandings of sensory integration
within their classroom environment.

Literature suggests that sensory integration is evident and effective in primary and
elementary education and there is great success with students with ASD and HFA. Although this
study’s main focus is on students with ASD and HFA, sensory integration and strategies can
benefit all students depending on how it’s implemented and understood as something to improve
behavior and time on task, not hinder or cause further distractions.

**Implications for Future Study**

Implications for further studies could involve looking at the same teacher teaching
different classes throughout the day to see how the student demographic (Ex: 9th graders or 9th-
12th graders), content (ex: Algebra 1 or Algebra 2), environment, teacher support (co-taught,
para-educators, etc.), and class size might vary the study. Additional research could follow a cohort of students to various classes to see how they adapt to different curriculum contents, peers, teachers, and overall environment. One teacher might have a different approach that could work to improve time on task and behavior while another could work on improving time on task and increasing positive behaviors.

**Implications and Recommendations for Practice**

The findings of this study are imperative because it indicates that teachers at the secondary level need to be trained and educated on how to use, implement, and understand sensory integration. Various stakeholders such as general educators, special educators, administrators, students and support staff will benefit from this study. These stakeholders are considered after reviewing the data from this study.

**General educators.** As stated previously, secondary general educators are typically experts in their specific content field. Depending on the teacher preparatory programs attended, multiple intelligence or various sensory approaches may not have been a part of the teaching pedagogy. To best enhance continued professional development in and outside of the school, general educators should co-plan with special educators, attend professional development sessions that can best address engaging learners in various ways through a sensory perspective. This was evident in some of the findings with Casey and Olivia. These were two teachers who engaged their learners in sensory integration with strategies they learned and developed over time with knowing and understanding their learners all along. Casey had an advantage since she took a class in her doctoral program that helped her understand sensory integration and she learned how to better serve the needs of her students. Moreover, it is obvious that in-service teachers at the collegiate level need to be trained on sensory integration. This should not be a
class or training that is just geared for special educators, but open to all in-service educators since all educators encounter special education students at some point.

**Special Educators.** Earlier in this study, a quote from Brownell, Ross, Colon, & McCullem (2005) stated:

“...research in special education teacher education is almost nonexistent. If we are to respond to policy makers’ scathing criticisms of teacher education and their pressure to increase alternative routes to the classroom, we need research that demonstrates how teacher education makes a difference in securing highly qualified special education teachers. (p. 248-249).”

When Melinda, the special educator, was asked about what training or experience she had with sensory integration she stated,

“...in terms of college courses, I’ve only had like two. And that was in graduate school and that was a long time ago because I went to graduate school back in 2001...well it was with special education, that’s what my degree was in. It wasn’t a whole course on autism. It was like, you know the various disabilities. So, for a month you might stay on learning disabilities or chapters or units if you will. But I had two classes and it depended on who the professor was too…”

This is a good example of a special educator who did have appropriate training to be a highly-qualified teacher. Conversely, Alex stated that her special educator does not come to class on time and does not help when asked; this occurs on a regular basis. Alex also shared that often the special educator causes the behavior in the classroom to escalate by engaging with students inappropriately, leaving the behaviors in the classroom to be the focal point of the lesson.

**Administrators.** A principal is the gatekeeper of a school. They set the direction and
morale of the building while acting as a liaison to the community. Not only should the principal keep a pulse on the building’s professional, social, and academic climate, they also function as the instructional leader and a source of pedagogic knowledge. Inclusion has a poor chance of success if the principal is not knowledgeable concerning educational needs of all children (Cline, 1981). Administration can take this study and use it as school wide professional development. Olivia and Casey could be model teachers, examples for other teachers to observe their classroom environment. Using a similar checklist to the one used during the study to introduce sensory integration and strategies could be eye opening to some teachers. Administration can also arrange coverage for teachers to find time in their schedule to observe the exemplar teachers and see how they are implementing strategies within various classroom environments. Lastly, this could be an evaluation tool for re-evaluation years and for teachers that are working towards tenure.

**Students.** Students represent the other significant stakeholder. Students with HFA, ASD, and sensory needs may not possess enough self-knowledge to understand their learning needs. Additionally, the teaching approach itself may limit or even occlude sensory needs and self-awareness in the inclusive classroom. This can be problematic and can augment difficulties with respect to time on task, thus increasing behavioral issues. Behavioral issues were recognizable in Elliot’s class due to various reasons that were not clearly stated by Elliot which left the researcher to draw their own conclusions.

In Elliot’s class, each observation witnessed many students off task and disengaged and it became very noticeable by the second observation that Elliot was not fully aware of his classroom dynamics. Especially during interviews, he would focus more on math concepts and discussion rather than the students and environment. On the other hand, Casey and Olivia’s
interviews and observations aligned with their teaching philosophy, their knowledge on sensory integration, and the final outcomes. The researcher concluded that these two teachers were very aware of their students’ needs, motivation, and ability and catered their lesson plans, structure, and environment to their students. During the second observation, Casey changed her plans completely once she received student feedback about wanting another day to work on their stories. During the second observation with Olivia, she stated in her final interview that she changed seats because she felt during the first observation there were a few chatty tables that she needed to split up. She admitted that once she switched seats, the environment was a different classroom.

**Staff support.** Although paraprofessionals do not hold teacher certifications, they too play an important role through direct contact with students. The job title as described in section 14B of IDEA (Individual with Disability Education Act) 2004: “Paraprofessionals… who are appropriately trained and supervised, in accordance with State law, regulations, or written policy … are to be used to assist in the provision of special education and related services … to children with disabilities” (20 U.S.C. 1412). This means that paraprofessionals are hired to support special education services for children with disabilities (Causton-Theoharis, 2009).

Throughout this study, three paraprofessionals (para-educators) were present. One was present in Olivia’s classes during the first observation for the first few minutes of class then the last few minutes; she stood in the back of the room by the lab tables. Alex had a paraprofessional in her room during the first observation who provided a one-on-one assistance to two special education students who appeared to have more severe needs than other students. She helped them follow along with assignments and ensured they were recording information. During the second observation with Alex, the paraprofessional was aiding a student in the bathroom while
the rest of the class was completing a lab outside. And lastly, in Melinda’s co-taught American Government class, there was an ESOL (English as a Second Language) paraprofessional in the room who sat in the back of the room at a desk on her electronics during the first and second observation.

**Researcher**

The findings of this study reveal a call of action in educating secondary teachers about the importance of sensory integration (SI) and what benefits it can bring within the classroom environment for both teacher and student. While the researcher understands, this is a systemic concern starting at the university level when student teachers begin developing their teaching pedagogy and philosophies; there is an opportunity for growth in applying the knowledge of sensory integration when hiring new staff into the school district. Every county or school district provides qualifications for certification and for the hiring process.

Here, the researcher can be a change agent in creating a handbook with SI strategies to include as part of the New Teacher Orientation in the fall before school begins. This handbook will identify SI and connect research from this study to support the development and foundational reasoning behind why this approach is successful in the classroom. The handbook will also include the strategies that were provided for the teachers and present real classroom examples from the study to underscore the success. The researcher will start with the Special Education Department for approval of this New Teacher Orientation handbook, then expand to the rest of the county for approval. The goal is to provide a tool for all teachers, but to focus on the secondary population since the literature supports there are a population of teachers that know very little about SI and what positive changes they can see in their classroom.
Conclusion

This study provided insight into the ways secondary teachers deliver curriculum and adapt their teaching philosophy and approach to incorporate sensory integration. Research supports that secondary teachers find self-regulation/organization the most successful sensory strategies within the classroom environment to ensure success for students with autism, special needs, and the general education population as well. Because of this, it is imperative to create a tool for new teachers entering the county to understand how to best implement sensory integration within their classroom with the correct information and research to support this methodology. Given all possible stakeholders, general and special educators, administration, staff support, and students, it is vital that every person in this educational puzzle is knowledgeable in understanding sensory integration, how it works, and how strategies put in place can change the trajectory of the classroom environment, student behavior, and can increase time on task.

Recommendations for moving in a new direction for existing educational practice would be to start at the university level and educate all teachers about the importance of sensory integration and how it can be implemented within the classroom across all grades, not just the primary level. This should not be information that only Occupational Therapists and few special educators receive – this information is applicable for all educators. In summation, the data collected and analyzed from this study are critical in moving forward in educating teachers because it demonstrates that teachers at the secondary level need the training and education on how to use, implement, and understand sensory integration to best serve the needs of students with ASD, HFA and the general population. A thorough understanding of what sensory integration can look like across the board in various contents, with various student abilities,
motivation, and needs could foster more time on task and less behavioral issues at the secondary level for not only students with ASD and HFA but with students in general.
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Appendix A: Foundational Sensory Chart

The following table provides examples of how sensory integration is paramount throughout various stages in a child’s development from birth to year seven and how each stage provides a foundation for the next stage of sensory integration.

Subsection I: Month one

<table>
<thead>
<tr>
<th>Sensory Modality</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Touch</td>
<td>Example: A child can tell if they are uncomfortable if they have a wet diaper, however, their senses are not sharp enough to decipher why they are wet or where they are wet, they just know they are uncomfortable.</td>
</tr>
<tr>
<td>Gravity and movement</td>
<td>Example: Holding a baby in one’s arms and suddenly lowering them a foot quickly, they will show alarm and arms and legs will move outward in hopes to grasp something to catch the fall.</td>
</tr>
<tr>
<td>Muscle and joint movement</td>
<td>Example: an infant will adjust their body in the arms of the person holding them.</td>
</tr>
<tr>
<td>Sight</td>
<td>Example: an infant can sense sight but not recognize a mother’s face or other significant objects. As vision develops the adaptive responses become more acute leaving an infant to have a stronger sense of sight.</td>
</tr>
<tr>
<td>Sound</td>
<td>Example: an infant will respond to the sound of a rattle or bell and also a human voice even though they cannot understand what the sounds mean.</td>
</tr>
<tr>
<td>Smell and taste</td>
<td>Example: This is organized at birth, it is not fully developed but taste is developed in the womb from the mother’s nutrients that the baby taste through amniotic fluids.</td>
</tr>
</tbody>
</table>
### Second and third months

| Eyes and Neck | Example: The brain must integrate three types of sensation, 1. Gravity and movement sensations from inner ears, 2. Sensation from the eye and muscles, 3. Muscle sensation from neck. The brain puts all three sensations together to know how to hold eyes and neck steady. |
| Rising up | Example: This development occurs in the prone position which provides an urge for the infant to lift chest from the sensations of gravity. |
| Grasping | Example: An infant’s hands are open to reach for objects and people. As body sensation occurs, the infant develops a sharper sense of how to aim and grab properly. |

### Fourth to sixth months

| Arms and hands | Example: an awareness of touch and admiring hands in space is developing. |
| Airplane position | Examples: infant lays on stomach and becomes more aware of the pull of gravity and have the urge to raise the head, upper back, arms, and legs at the same time. |
| The joy of being moved | Example: The feeling of being picked up and swung is a strong sensation. If a child cannot integration this sensation, they will will feel a change in their nervous system and will cry. |

### Sixth to eighth months

<p>| Locomotion | Example: an infant crawling and creeping on hands and knees contribute to many sensory integrative components to an infant’s development. |
| Spatial perception | Example: While crawling and creeping, an infant learns the physical structure moving from one place to another. |</p>
<table>
<thead>
<tr>
<th>The fingers and eyes</th>
<th>Example: an infant can use thumb and forefinger in a scissor pinching movement to pick up small things. Fine hand eye coordination.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor planning</td>
<td>Example: movements are planned, sensation from the body provide information necessary to plan the next movement.</td>
</tr>
<tr>
<td>Babbling</td>
<td>Example: an infant can recognize different sounds and words.</td>
</tr>
</tbody>
</table>

Ninth to twelfth months

<table>
<thead>
<tr>
<th>Play</th>
<th>Example: Developing the ability to cross the midline, reaching hands across the body.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stand up</td>
<td>Example: This requires integration of gravity, movement, and muscle and joint sensation of the months before.</td>
</tr>
<tr>
<td>Words</td>
<td>Example: Can understand a fair amount of words, sensations arise from body movement help stimulate a part of the brain involved in making sounds.</td>
</tr>
</tbody>
</table>

Second year

<table>
<thead>
<tr>
<th>Localization of touch</th>
<th>Example: a child is now aware of where they are touched and can somewhat direct responses voluntarily.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moving</td>
<td>Example: Picks things up, throws them, pushes and pulls toys, walks up and down stairs explores the home and the outdoors.</td>
</tr>
<tr>
<td>Mapping the body</td>
<td>Examples: a child enjoys roughhousing, piggyback rides, and swinging. This provides a sensory input from the body and from the gravity receptors in the inner ears.</td>
</tr>
<tr>
<td><strong>Climbing</strong></td>
<td>Example: In order to climb, a child must have well organized gravity and movement sensations first. This requires a great deal of sensorimotor intelligence which is an important development toward visual space perception.</td>
</tr>
<tr>
<td>----------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Selfhood</strong></td>
<td>Example: A sensation from a child’s body making them feel secure and competent individual. This means they are separate from their mother or any other person.</td>
</tr>
</tbody>
</table>

### Third through seventh years

<table>
<thead>
<tr>
<th><strong>Using Tools</strong></th>
<th>Example: Using simple tools such as a knife, fork, shovel, pails, needle and thread, scissors, or crayons help a child become more familiar with their surroundings through a sensory integrative perspective.</th>
</tr>
</thead>
</table>

*Adapted from Ayres (1979, 2005)*
### Appendix B: Sensory Strategies

#### Sensory Strategies for the Classroom

<table>
<thead>
<tr>
<th>Category</th>
<th>Strategies</th>
</tr>
</thead>
</table>
| **Physical Comfort and Focus** | - Alternative seating (wiggle chair, exercise ball, standing desk)  
- Attach stretchy exercise band to chair legs to bounce feet  
- Weighted vest, weighted ipad, wiggle cushion  
- Use of handheld fidgets  
- Provide a space outlined in tape to the side that allows movement  
- Encourage comfortable positions (lying on floor, using clipboard, working at an easily or whiteboard, etc.)  
- Provide earplugs or noise cancellation headphones for few distractions |
| **Self Regulation and Organization** | - Create daily class routines and stick to them  
- Communicate when there is a schedule change ahead of time  
- Work in a signal for a student who gets overwhelmed or needs a break  
- Have chewing gum handy |
| **Classwork and Testing**      | *Teacher can:*  
- Reduce handwriting (fill in the blank questions, allow extra time for writing, use of electronics, etc.)  
- Seat students away from buzzing lights, doors or windows (fewer distractions)  
- Minimize use of visual input on a page  
- Provide colored overlays for reading to minimize visual distractions  

*Student can:*  
- Use folder dividers to create a “Screen” for fewer visual distractions  
- Pencil grip, slant board, bold or raised lined paper when writing  
- Text to speech software  
- Highlighter or sticky notes  
- Listen to music while working to keep focused and self regulate |

*Adapted from www.understood.org*
Updated Research Process

1. Classroom Observation #1: Objective- To observe the instructor, classroom environment, and student/teacher interactions before interview (using classroom protocol- already approved by IRB)

2. Interview #1: Objective- To gather basic information about the teacher and their general understanding of sensory integration in relation to their classroom environment and teaching philosophy.
   a. How long have you been teaching?
   b. How long have you taught this content?
   c. Have you taught another grade/content? If so, what?
   d. Have you taught in private school before?
   e. Have you co-taught before?
   f. How does your teaching philosophy include students with IEPs and 504s?
   g. How would you describe sensory integration?
   h. What prior knowledge and/or training have you had in the field of sensory integration in the classroom?
   i. **At this point, I go through the sensory integration strategies and tools that could be implemented within the classroom** (See attachment with strategies)

3. Classroom Observation #2: Objective- To observe whether the teacher could use any of the interview knowledge to implement within the classroom (using classroom protocol- already approved by IRB)

4. Interview #2: Objective: To have the teacher reflect on any new information or strategies that were used in the classrooms.
   a. Can you describe the classroom lesson that I observed?
   b. Did the lesson go as you expected? Why or why not?
   c. If you had to teach this over again, would you make any changes?
   d. Were you pleased with the student outcomes, why or why not?

   Sensory Integration questions:
   - Prompt: How does SI affect classroom behavior?
   - Prompt: How does SI affect academic performance?
   - Prompt: How does SI affect social relationships in the classroom?
### Appendix D: Classroom Protocol

**Classroom Observation Protocol**

<table>
<thead>
<tr>
<th>Teacher:</th>
<th>Observer:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation date/time:</td>
<td>Observation date/time:</td>
</tr>
<tr>
<td>Subject:</td>
<td>Students (amount):</td>
</tr>
</tbody>
</table>

Select one from scale 0-not observed 1-minimal 2- to some extent 3- very descriptive observation

<table>
<thead>
<tr>
<th>Sensory Integration</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Teacher awareness</strong>- Instruction adjusted or differentiated based on student sensory learning needs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sensory integration</strong>- Is there a place for a sensory break? Sensory integration is obvious within the lesson and/or classroom environment.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Student/teacher communication</strong>- Does student know a sensory diet/break is an option? Is the student able to express a sensory need throughout the lesson?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Overall Summary</strong>- Sensory integration and/or diet implemented within the classroom/lesson</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:

Select one from scale 0-not observed 1-minimal 2- to some extent 3- very descriptive observation

<table>
<thead>
<tr>
<th>Time on task</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Time on task</strong>- Student engagement to the lesson/task. (Ex: asking questions, participating with peers, taking notes, etc.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Time on task</strong>- Student engagement to the teacher. (Ex: Periodic open body language, participating, etc.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Time on task with sensory integration</strong>- Student is engaged with sensory integration differentiation (Ex: tactile, olfactory, auditory, etc.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
Select one from scale 0-not observed 1-minimal 2- to some extent 3- very descriptive observation

<table>
<thead>
<tr>
<th>Student/Teacher Communication</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Student/Teacher Communication</strong> - Student knows a sensory break or diet is available or can ask if they need sensory integration.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Social/Emotional</strong> - Does the teacher know how to de-escalate a student when they need a sensory break or integration within the lesson?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Teacher/Teacher Communication</strong> - Do general and special educator communicate about student needs during lesson?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: