

EXAMINING THE ACQUISITION AND IMPLEMENTATION OF SENSORY PATHS TO
SUPPORT STUDENTS' ON-TASK BEHAVIOR

By

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DEDICATION

I would like to dedicate this project to my husband and children. Little did they know when I enrolled at Austin Peay State University in the spring of 2011 that I would end up being a student for the next 10 years! Without the support from my husband, Luke, who helped keep everything running smoothly at home I would not have been able to accomplish any of this. He has supported me through four degrees and a full-time teaching job. Without that support I would not have been able to pursue all that I have.

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ABSTRACT

RACHEL FUNDERBURK. Examining the Acquisition and Implementation of Sensory Paths to Support Student's On-Task Behavior (under the direction of DR. SHERRI PROSSER).

This study sought to determine (a) the decision-making processes administrators and teachers followed when purchasing and implementing a sensory path intervention in elementary schools and (b) the perceived supports and barriers to the effective use of the sensory path as a means to positively impact student outcomes. Five elementary school administrators and 12 elementary school teachers in a single school district completed surveys; four administrators and five teachers participated in follow-up interviews. This study used an explanatory sequential mixed methods approach. Surveys were a secondary data source and were analyzed using descriptive statistics. Participants for the semistructured interviews, the main data source, were selected by intensity sampling. Interviews were analyzed using in vivo coding. Findings indicated that administrator and teacher decision making processes were informal, acquisition targeted students with disabilities but use expanded to other populations, and efficacy was based on anecdotal observations. Findings also indicated that sensory paths were perceived as being worthwhile but could have been improved with formal implementation plans and greater accessibility. Implications for research include study replication in additional contexts, as there is a paucity of research available on sensory paths and their use in K-12 schools. Implications for practice include the need for formal fidelity of implementation plans and data collection plans, to determine efficacy, prior to the purchase of interventions and for acquisition decisions to include verification of an intervention as an evidence-based practice.

Keywords: sensory path, decision-making processes, students with disabilities, diffusion of innovation, fidelity of implementation

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Chapter I

Introduction

According to the National Center for Education Statistics (2020), there was a 13% increase in the number of students with disabilities served in the public school setting from the 2011-2012 school year to the 2018-2019 school year. Students with disabilities account for approximately 14% of students enrolled in the traditional public school system (National Center for Educational Statistics, 2020). There are currently 13 disability categories identified by the federal government in the Individuals with Disabilities Education Improvement Act (IDEIA) these disabilities include autism spectrum disorder (ASD), deaf-blindness, emotional disturbance, hearing impairment, intellectual disability, multiple disabilities, orthopedic impairments, other health impairments, specific learning disabilities, speech or language impairments, traumatic brain injury, and visual impairments (U. S. Department of Education, 2018). During the 2018-2019 school year, 95% of children with disabilities between the ages of 6-21 were enrolled in traditional public schools with 64% of those students spending 80% or more of their day in the general education setting (National Center for Educational Statistics, 2020). This includes students with both high-incidence and low incidence disabilities (National Center for Educational Statistics, 2020), which are typically those serviced with an individual education plan (IEP) or 504 plan (Gage et al., 2012; Loe & Feldman, 2007).

The way students with disabilities are educated has gone through major transitions over time (Rotatori et al., 2011). The earliest educational settings for students with disabilities were often residential or institutions where they were not educated with their non-disabled peers (Rotatori et al., 2011). Various legislation has been passed over time that eventually led to the current “least restrictive environment” (LRE) provision, that mandates children be educated with

their non-disabled peers to the maximum extent possible (IDEIA, 2004). The LRE provision led to the development of a continuum of special education placements and teaching models including separate school settings, separate classes within the public school setting, pull-out intervention services, inclusion support in the general education classroom, and consultation (Heward, 2013). With the increase in the number of students with disabilities enrolled in regular schools, it is imperative teachers are informed of the continuum of special education services.

Students with disabilities, specifically those with ASD or attention-deficit/hyperactivity disorder (ADHD), may have a difficult time staying on task in the classroom, which can lead to distractions for them and their peers (Goh, 2017; Reyes et al., 2012). Students who display off-task behavior may miss out on important instruction and possibly lead to a negative impact on their overall achievement (Goh, 2017; King et al., 2016). Classroom teachers should be familiar with the evidence-based practices available to them that may help increase on-task behavior and prevent lost instructional time for all students (Rahn et al., 2107; Torres et al., 2012). Evidence-based practices are teaching techniques or interventions that have been vetted through research and found to be beneficial to students (Cook et al., 2012; Dillon et al., 2017; Heward, 2013).

There are many different types of evidence-based practices that can be beneficial to classroom teachers but for teachers to implement and use them in an effective manner they must first have the preservice and professional learning needed to be competent at implementing strategies and tools in their classrooms. Preservice teachers may not receive the training necessary to be immediately effective at implementing classroom-based interventions and would likely need professional learning throughout their tenure to help them develop these skills (Shaffer & Thomas-Brown, 2015; Taylor & Ringlaben, 2012).

Educational leaders are tasked with identifying, purchasing and implementing interventions that can be used to increase on-task behavior and student engagement. When a school administrator or classroom teacher decides to adopt and implement a program or intervention, they should have the necessary training and knowledge needed to successfully execute the program and evaluate its effectiveness after implementation (Fixsen et al., 2009). Additionally, educational leaders must have the support of their colleagues and provide the training needed to help ensure interventions are implemented with fidelity by all (Carroll et al., 2007; Dusenbury et al., 2003).

Problem of Practice

Student engagement due to off-task behavior has been a persistent problem faced by those in education and negatively impacts academic achievement (Godwin et al., 2016). All children can have difficulty attending to activities or tasks as their attention span typically lasts 3 to 5 minutes for each year of their age; typical five-year-olds, therefore, should be able to attend to a task for approximately 15-25 minutes (Lengel & Kuczala, 2010). Students in elementary schools can spend anywhere from 10% to 50% of their time demonstrating off-task behavior in the general education classroom (Godwin et al., 2016). Many students with disabilities have difficulty with attention issues and self-stimulatory behaviors that can lead to off-task behavior and can cause them to be distracted or be a distraction to their classmates (Mays et al., 2011). When attention is disrupted during instruction, students can miss information they need to be successful at learning new skills and mastering grade-level standards (Mays et al., 2011; Miramontez & Schwartz, 2016). Some elementary schools in my district have implemented a movement intervention called a “sensory path” as a means to increase on-task behavior. Sensory paths, however are not an evidence-based practice and their efficacy in my district is unknown.

The task of finding these interventions typically falls to classroom teachers. However, if funding is needed to (a) purchase the intervention supplies or device or (b) learn how to implement the intervention, a building administrator would need to approve the use of school funds. A classroom teacher or guidance counselor, for example, would have to make a purchase request for the sensory path. Sensory paths come with an instruction manual but any professional learning beyond that would have to have been created at the school level or sought out by the teachers on an individual basis. At times interventions can be costly and those making the purchase decisions need to ensure to approve interventions that are research-based and proven effective at impacting student outcomes.

Statement of Purpose

The purposes of this study were to describe (1) the decision-making processes of elementary school personnel related to acquiring and implementing a sensory path intervention, (2) the perceptions and uses of a sensory path related to student behavior and (3) the supports and barriers of elementary school personnel in implementing a sensory path intervention. The following research questions guided this study:

1. What were the decision-making processes of administrators and teachers regarding the acquisition of a sensory path intervention?
2. What do administrators and teachers perceive as the uses and efficacy of a sensory path intervention in moderating students' on-task behavior?
3. What do administrators and teachers perceive as supports and barriers to the effective use of a sensory path intervention?

Overview of Methodology

A concurrent mixed methods research design (Creswell & Plano Clark, 2018) was conducted to evaluate the research questions. The primary data source was qualitative and the quantitative data was collected as a secondary source used to supplement the qualitative results. Qualitative data was collected during the spring of 2021 semester by conducting surveys and interviews with school administrators and teachers. The Likert scale survey responses were analyzed using descriptive statistics. The open-ended survey responses and interviews were analyzed using theoretical thematic analysis (Clarke & Braun, 2017). Results from both the quantitative data and qualitative data were examined for common themes to analyze the results and develop overall findings.

Significance of the Study

Reyes et al. (2012) state that “student engagement is vital to academic achievement. Engaged students are attentive and participate in class discussions, exert effort in class activities, and exhibit interest and motivation to learn” (p. 1). Students with attention issues often demonstrate lower grades and achievement scores, are more likely to have behavior issues, and are at risk for dropping out of school before graduation (Reyes et al., 2012; Swank & Smith-Adcock, 2018).

As classroom instruction becomes more rigorous and demanding it is more important than ever that students are on task and engaged with the lessons being taught. The No Child Left Behind Act of 2001 introduced sweeping education reform focused on improving school performance in academic subject areas such as reading, mathematics, and science (Mullins et al., 2019). The legislation also included new accountability measures that focused on the

improvement of educational outcomes for all students especially those from disadvantaged backgrounds (e.g., economically marginalized families; Gilmour et al., 2018).

Along with the new requirements in the act came a push to find effective evidence-based interventions that could be implemented in classrooms to help increase on-task behavior and student outcomes (Locke et al., 2015). Often times educators use “personal experience, tradition, and expert opinion” to make decisions regarding instructional materials and interventions used in the classroom (Cook & Cook, 2011, p. 71). The use of evidence-based practices are requirements addressed in both the Every Student Succeeds Act of 2015 and the IDEIA of 2004 (Hsiao & Sorenson Peterson, 2019). Evidence-based practices are those that have been vetted with thorough research studies (Every Student Succeeds Act, 2015; Hsiao & Sorenson Peterson, 2019; IDEIA, 2004). Teachers need to be able to not only identify evidence-based practices but must be trained to use them appropriately and consistently in the classroom (Hsiao & Sorenson Peterson, 2019). Educational leaders are then tasked with not only finding interventions to adopt and implement but also finding the funds to do so (Hsiao & Sorenson Peterson, 2019). Once programs are implemented, school leaders and teachers are responsible for evaluating the effectiveness of interventions implemented in their school (Tunison, 2020).

Definition of Key Terms

1. **504 plan:** a legal document provided under the Vocational Rehabilitation Act of 1973 that provides accommodations and related services to students in the general education setting that have a condition found to substantially limit “a major life activity such as learning” such as attention-deficit/hyperactivity disorder or a chronic medical condition (Loe & Feldman, 2007, p. 647).

2. **Decision-making process:** the process through which educational leaders and teachers use a wide range of sources to collect and analyze data to inform the decisions made related to practice and policy in classrooms and schools (Mandinach, 2012; Mandinach & Schildkamp, 2020).
3. **Evidence-based interventions:** strategies shown to have an impact on improving student outcomes after being studied through high-quality research (Dillon et al., 2017).
4. **Individual education plan:** a legal document provided to students who have met the criteria to qualify for special education services under one of the 13 disability categories in the Individuals with Disabilities Education Improvement Act of 2004. The individual education plan contains specific goals, services, and accommodations or modifications that are needed for the student to be successful in their least restrictive environment (Gage et al., 2012).
5. **Multi-sensory environment:** a space designed to provide students with a variety of sensory stimulation using visual, auditory, tactile, or olfactory items that can allow for students either seeking or avoiding sensory stimulation to take a calming break in an effort to refocus and return to the learning environment (Carter & Stephenson, 2012).
6. **Off-task behavior:** physical movement, verbal distractions, or inattention that draws the student's attention away from the learning task at hand (Beserra et al., 2019; Goh, 2017) and causes disruptions in learning to themselves or others (Godwin et al., 2016).
7. **Sensory path:** a series of specially designed decals that can be placed on floors and walls that allow for movement and academic tasks to be integrated into a brief movement activity that provides users with the opportunity to refocus and decrease negative behavior while increasing cognitive function (The Sensory Path, 2020).

Chapter II

Synthesis of the Research Literature

The introduction describes the content, scope, and organization of the review as well as the strategy used in the search.

Theoretical Framework

This study will be framed by the diffusion of innovation theory (Rogers, 2003). According to Rogers (2003) the diffusion of innovation theory “is the process by which an innovation is communicated through certain channels over time among the members of a social system” (p. 11). Diffusion is a type of communication in which messages of a new idea are shared through two-way communication between individuals (Rogers, 2003). Typically, diffusion is related to the sharing of new ideas and information (Rogers, 2003).

Rogers (2003) explains innovations can be an idea, process, or object that is new or being used for a use other than its original purpose. Innovations happen regularly in education as teachers have to adapt to be able to keep up with the ever-changing world (Frank et al., 2011; Morrison et al., 2019). The education world is often trying to keep up with the rapid diffusion of new innovations such as technology (Morrison et al., 2019), evidence-based practices and interventions (Cook & Cook, 2011), and data-based decision-making methods (Mandinach & Schildkamp, 2020).

Educators now focus on teaching children the critical thinking skills they will need to be college and career ready (Tunison, 2020). Due to how rapidly advances are being made innovations are frequently happening especially in the field of technology (Morrison et al., 2019). In the world of education, this could mean innovations are adopted and implemented sooner than they should be or without evidence to support their effectiveness (Cook & Cook,

2011; Tunison, 2020). The Every Student Succeeds Act (2015) mandates that interventions or programs adopted by schools be evidence-based and proven effective by scientifically backed research, which means innovations should not be implemented until they are adequately assessed. This is even more important when innovations are costly.

Review of Literature

The review of the research literature synthesizes information related to students with disabilities, different models of special education, on-task behavior and its impact on attention and achievement, evidence-based practices used to increase on-task behavior (i.e., classroom management strategies, behavioral interventions, and sensory interventions), and teacher knowledge of evidence-based practices. This review concludes with a summary of literature related to quality indicators for program implementation and process evaluation (i.e. project implementation, context, participant responsiveness, adherence, dose).

High-Incidence Disabilities

High-incidence disabilities are those that are the most commonly found among children with disabilities (Gage et al., 2012). The National Center for Educational Statistics (2020) indicates that the disabilities with high-incidence rates among children ages 3-21 for the 2018-2019 school year include specific learning disabilities, speech or language impairments, other health impairments, and ASD. These categories accounted for 78% of the students identified with disabilities enrolled in public schools (National Center for Educational Statistics, 2020).

The two most common disabilities related to a reduction of focus and attention in the classroom are ADHD and ASD (National Center for Educational Statistics, 2020). Nearly 25% of children with disabilities in public schools are identified as having ASD or an “other health impairment,” which is the disability category that includes ADHD (National Center for

Educational Statistics, 2020). As of 2016, approximately 1 in 54 children were identified as having ASD (Centers for Disease Control and Prevention, 2020). The estimated number of children identified with ADHD in 2016 was 6.1 million and of those children with ADHD 9 out of 10 children received some form of support in school through the use of accommodations provided by an individual education plan (IEP) or a 504 plan (Centers for Disease Control and Prevention, 2019b). Both of these disabilities tend to impact males more than females; 12.9% of males are identified with ADHD compared to only 5.6% of girls (Centers for Disease Control and Prevention, 2019b) and males are also four times more likely than females to be diagnosed with ASD (Centers for Disease Control and Prevention, 2020).

Attention-Deficit/Hyperactivity Disorder

ADHD is a neurodevelopmental disorder that typically manifests during childhood (Faramarzi et al., 2016). The symptoms include inattention, impulsivity, hyperactivity, and disorganization all of which interfere with the child's daily functioning and development (Benzing et al., 2018; Faramarzi et al., 2016; Swank & Smith-Adcock, 2018) and can have a major impact on a child's executive functioning skills (Faramarzi et al., 2016). Executive functioning skills are those that help a child make decisions, organize and plan actions, working memory, retention, problem-solving, and information processing (Benzing et al., 2018; Faramarzi et al., 2016).

Due to the impact ADHD can have on students they are more likely to be at risk for achievement and behavioral issues in school (Verret et al., 2012), which can lead to being retained in a grade, special education placement, suspensions, or even dropping out of school (Gaastra et al., 2016). The biggest struggles for students come in the classroom where many times students with ADHD engage in off-task behaviors such as talking to classmates, shouting

out, leaving their seat or area without permission (Gaastra et al., 2016), not following directions, or completing appropriate tasks (Swank & Smith-Adcock, 2018). On top of all of the issues ADHD can have for the diagnosed student it can also cause a disturbance to the learning environment for other students as well as elicit “maladaptive behavior of both classmates and the teacher” (Gaastra et al., 2016, p. 2), which can lead to a negative relationship between the teacher and the students (Gaastra et al., 2016).

The most common treatment for children with ADHD is stimulant medications that can enhance on-task behavior and help increase achievement, however, this intervention comes with a list of possible side effects that could be detrimental to the child (Gaastra et al., 2016). Other recommendations include behavior management interventions, social skills interventions, therapy, parent training, and educational interventions and supports that can be put in place in the school environment (Centers for Disease Control and Prevention, 2019a).

Autism and Sensory Processing Disorder

ASD is a “group of developmental disabilities causing significant delays in communication and social skills and is associated with repetitive behavior and stereotypical movements” (Dillon et al., 2017, p. 1). Examples of stereotypical movements are slapping, rubbing, or flapping hands together, rocking, covering ears or eyes, making noises, rubbing, smelling, or tasting objects (Mays et al., 2011). ASD is a neurological disorder that typically manifests during childhood and lasts a lifetime (Miramontez & Schwartz, 2016). ASD is a continuum of disorders that can range from mild to severe and includes Asperger syndrome, autism, and pervasive developmental disorders not otherwise specified (Liu et al., 2015). It is characterized not only by deficits in social interactions, communication, restrictive or repetitive behaviors but can include possible cognitive deficits as well (Bhatt et al., 2017; Liu et al., 2015;

Miramontez & Schwartz, 2016). While there is no known cure for ASD many treatments, therapies, and interventions have been successfully used to reduce the stereotypic or disruptive behaviors that are associated with ASD as well as help to increase communication and social skills (Liu et al., 2015).

Current estimates indicate that between 45% and 96% of children with ASD have difficulty with sensory-related issues (Schaaf et al., 2014). An additional 5% to 16% of children without a disability may have “difficulties processing and integrating sensations that affect their participation in activities of daily living” (Schaaf et al., 2018, p. 1) this is what is known as sensory processing disorder (SPD) (Schaaf et al., 2018). Sensory processing disorder can often impact children with other disabilities as well, the most common being children with ADHD and other developmental delays (Sher, 2016).

Sensory processing difficulties are characterized by sensitivities to one’s surroundings. A child may be hypersensitive, meaning they are highly sensitive to sensory input such as information, sounds, smells, touch, or sights (Sher, 2016). Children then tend to avoid these stimulus because they are overwhelming (Sher, 2016). One may also be hyposensitive so they seek out this sensory input as their current input level may be muted (Sher, 2016). This sensory-seeking behavior happens because the brain is not able to properly regulate and integrate sensory input (Sher, 2016). Sensory processing deficits often lead to the stereotypical behaviors demonstrated by children with ASD, these behaviors are often displayed by children as a means to seek or avoid sensory input and are caused by abnormalities in sensory processing (Bhatt et al., 2017; Mays et al., 2011). The purpose behind these sensory-seeking behaviors is to provide children with “tactile, proprioceptive (pressure), or vestibular (movement) stimulation not available in the environment” (Mays et al., 2011, p. 46-47).

Sensory processing or sensory integration is the process through which the brain processes and integrates information it is receiving through the sense organs (Bhatt et al., 2017). When the brain is unable to effectively process this information it leads to the person acting irrationally when responding to sensory stimuli (Bhatt et al., 2017). Sensory processing issues can impact all aspects of a person's life including socially, emotionally, and cognitively (Bhatt et al., 2017).

Sensory processing disorders can be classified into three different categories sensory modulation disorder, sensory-based motor disorders, and sensory discrimination disorders (Bhatt et al., 2017). Sensory modulation disorder is when someone is unable to control their reaction or its intensity to certain sensory stimuli (Bhatt et al., 2017). Examples of stimuli people may respond to include light, touch, texture, and sounds (Bhatt et al., 2017). Children with sensory-based motor disorders may have difficulty with their posture, and/or coordination (Bhatt et al., 2017). Sensory discrimination disorder occurs when children are not able to correctly process sensory information (Bhatt et al., 2017). Sensory processing can impact a child in many different ways, the child could be hypersensitive, avoiding stimuli, hyposensitive, seeking stimuli, or a combination of the two (Bhatt et al., 2017).

Pushing, inappropriate use of materials, inappropriate moving and touching, and other disruptive behaviors can all be related to sensory seeking behaviors (Wild & Steeley, 2018). Some students may, on the other hand, be sensory avoiders and have difficulty with loud noises, bright lights, large groups, and other classroom activities (Wild & Steeley, 2018). Those with sensory dysregulation or modulation difficulties often appear to have attention difficulties, are easily distracted, struggle with multi-step directions, and have a hard time with transitions (Wild & Steeley, 2018).

Stereotypic behaviors are a response to sensory feedback they are typically non-functional and repetitive and can lead to inappropriate behaviors (Liu et al., 2015). These behaviors may interfere with a “student’s ability to attend, communicate, learn, and interact” (Mays et al., 2011, p. 46) during learning situations, which can lead to the student withdrawing from participating and interacting with others and may prevent the acquisition of new skills (Liu et al., 2015; Mays et al., 2011). Stereotypical behaviors may impact the student’s classroom performance and ability to learn as it can be difficult to interrupt the behaviors of the student to gain their attention or engage them in a learning activity (Mays et al., 2011; Wild & Steele, 2018). This can lead to problems such as reduced attention, which can interfere with the student being able to learn the given task or skill (Liu et al., 2015).

While ASD is a lifelong disorder (Miramontez & Schwartz, 2016) with no specific cure (Liu et al., 2015) many different therapies and interventions have been successful in attempting to reduce the negative behaviors associated with ASD (Liu et al., 2015). Treatments, therapies, and interventions that have been used include occupational therapy, speech and language therapies, medications, applied behavior analysis (Liu et al., 2015), sensory integration therapy, gross motor activities, and multi-sensory environments (Wild & Steele, 2018).

Special Education Models

There have been many changes to the way special education services are provided to students including the educational settings where students are placed due to the current legislation (Gilmour et al., 2018). Special education models have undergone major changes throughout history based upon the changes in philosophical beliefs related to those with disabilities (Rotatori et al., 2011). Individuals with disabilities were once feared and segregated and sent to live in isolation and subjected to inhumane living conditions and treatment (Rotatori

et al., 2011). Under current legislation, for schools to maintain their funding at least 95% of students with disabilities are now required to participate in state assessments and show growth in closing their achievement gaps (Gilmour et al., 2018).

The earliest educational settings for children with disabilities included residential institutions and specialized schools where children were isolated from not only their typical peers but the outside world as they were thought to be “defective individuals who were perceived as deviant and threatening” (Rotatori et al., 2011, p. 4). Before the 1950s, it was commonplace for children with disabilities to be excluded from attending public schools and those few students who did were more likely to drop out of school (Kim et al., 2019).

The landmark civil rights case *Brown v. Topeka Board of Education* (1954) made it illegal to separate children by race into separate school settings establishing that “separate but equal is not equal” (Rotatori et al., 2011, p. 7). This led families of children with disabilities to seek legal action to ensure their children would also have access to a free appropriate public education (Heward, 2013; Kim et al., 2019; Rotatori et al., 2011). In 1965, the landmark Elementary and Secondary Education Act provided federal funds for states to create educational programs for students with disabilities (Kim et al., 2019). In 1972, the *Pennsylvania Association for Retarded Children v. Commonwealth of Pennsylvania* challenged the fact that students were still being segregated and denied equal access because schools deemed them “unable to profit from public school attendance” (Heward, 2013, p. 15). The courts, however, determined that not only should children with disabilities be allowed to attend public schools, but they should also be placed in the general education settings within public schools rather than segregated settings (Heward, 2013).

The passage of the Education for All Handicapped Children Act (1975) provided the foundation for the rights of children with disabilities and their families and mandated compulsory education for all students with disabilities. In 1990, this law was renamed and reauthorized as IDEA and, in 2004, updated and reauthorized as the IDEIA. Two major components of IDEIA include the zero reject clause, which means schools must educate all children with disabilities, and the LRE component that requires schools to educate children with disabilities with their typical peers to the maximum extent possible when appropriate (IDEIA, 2004).

The incorporation of LRE meant that the placements for special education students should begin in the general education setting and become more restrictive as needed (IDEIA, 2004). School systems must now offer a continuum of placements and services to include alternative placements in order from most restrictive to least. These placements are homebound or hospital, residential facility, separate school, separate special education classroom, resource room, general education classroom with supplementary services and supports, general education classroom with consultation services, and the general education classroom (Heward, 2013).

In the fall of 2017, approximately 95% of students with disabilities were enrolled in the traditional public school setting (National Center for Educational Statistics, 2020; U.S. Department of Education, 2018). During the 2018-2019 school year approximately 63% of students with disabilities were educated within the general education classroom for 80% of the day or more which was an increase from the fall of 2000 when only 47% of students with disabilities were in the general education classroom for at least 80% of the day (National Center for Educational Statistics, 2020; U.S. Department of Education, 2018).

On-Task Behavior and Academic Achievement

Lost instructional time in educational settings is an established problem that has been studied by educators and researchers for over a hundred years (Godwin et al., 2016). Students are expected to participate in extended bouts of academic instruction in the classroom, which can lead to restlessness and reduced concentration leading to off-task behaviors (Goh, 2017). Off-task behavior is one of the largest contributors to lost instructional time during the school day and one of the most common reasons for discipline referrals (Godwin et al., 2016), which can ultimately lead to significant academic deficits and difficulties for all students (Goh, 2017; King et al., 2016).

Students are considered on task when they are focused on the learning task or activity (Beserra et al., 2019). On-task behavior plays a role in the student's ability to acquire skills, master content, and their overall achievement (Beserra et al., 2019). On-task behaviors include “paying attention to teachers, following class rules, and actively engaging in tasks appropriate to the learning situation” (Goh, 2017, p. 179). Anytime students are focused on other activities would constitute off-task behavior, “which can be associated with low academic performance” (Beserra et al., 2019, p. 1,362). Off-task behavior may come in three different forms: motor (e.g., movement), verbal (e.g., talking out), and passive (e.g., inattentive; Moffett & Morrison, 2019). Similarly, Godwin et al. (2016) classified off-task behaviors into five different categories: self-distraction, peer distraction, environmental distraction, walking, and other.

Students often display visual cues when they are beginning to lose focus and become off task (Lengel & Kuczala, 2010). Focus is “the ability to select and concentrate exclusively on certain information” (Beserra et al., 2019, 1,362). Cues indicating a loss of focus include staring off into space, fidgeting, humming, doodling, talking to neighbors, shouting out, acting out by

breaking rules, interrupting others, and not finishing given tasks (Lengel & Kuczala, 2010). Being aware of these cues and understanding how to respond to them can help the classroom teacher quickly refocus and reenergize the students so they remain engaged in the learning process (Lengel & Kuczala, 2010). It is imperative students can focus throughout the learning process, “if a student is not focused on the task, the time spent on task decreases as does learning” (Beserra et al., 2019, p. 1,362).

Students are more likely to learn the academic and social skills they need to be successful in school if they are actively engaged not only with the learning process but also with their teachers and peers (Miramontez & Schwartz, 2016). Research has been conducted on increasing engagement and on-task behavior for all students in the classroom, which found supports can include the intentional arrangement of the classroom environment, visuals, self-monitoring techniques, and reinforcement systems (Miramontez & Schwartz, 2016). While these supports can be used with the entire class, students with disabilities may need more targeted and specific interventions to keep them focused and on task during instruction (Miramontez & Schwartz, 2016).

Students with disabilities may struggle to stay on task more than their typical peers, which can become a distraction from the lesson for themselves and their peers (Goh, 2017). This off-task behavior can then lead to lost instructional time for all students (Reyes et al., 2012). Students in elementary schools can spend anywhere from 10% to 50% of their time demonstrating off-task behavior in the general education classroom (Godwin et al., 2016). The amount of time students are not engaged in on-task behavior during academic activities could ultimately impact their ability to acquire and retain the skills needed to master the grade-level standards needed to be successful in the classroom (Godwin et al., 2016; Goh, 2017).

Given the current prevalence of disabilities such as ASD and ADHD it is likely that the average classroom would have at least one child that struggles with maintaining attention and focus that receives some portion if not all of their instruction in the regular education setting each day (Camargo et al., 2014; Gaastra et al., 2016; Gage et al., 2012). Between the years 1990-2008, there was a 93% increase in the number of students with high-incidence disabilities serviced in the general education setting for at least 80% of the day (Morningstar et al., 2017). General education teachers can be apprehensive about serving this population of students in their classrooms mainly because they feel inadequately prepared, supported, and trained to help these students (Heward, 2013; Scott, 2017; Stites et al., 2020).

Evidence-Based Practices to Increase On-Task Behavior

Evidence-based practices are instructional techniques and interventions that have been through a rigorous research process and found to be beneficial (Cook et al., 2012; Dillon et al., 2017; Heward, 2013). Evidence-based practices can be useful in targeting specific student needs and improving the performance of students with disabilities (Rahn et al., 2017; Torres et al., 2012). According to Dillon et al. (2017), the Every Student Succeeds Act defined evidence-based as:

An activity strategy or intervention that (i) demonstrates a statistically significant effect on improving student outcomes or other relevant outcomes based on (I) strong evidence from at least 1 well-designed and well-implemented experimental study; (II) moderate evidence from at least 1 well-designed and well-implemented quasi-experimental study; or (III) promising evidence from at least 1 well-designed and well-implemented correlational study with statistical controls for selection bias; or (ii) (I) demonstrates a rationale based on high-quality research findings or positive evaluation that such activity,

strategy, or intervention is likely to improve student outcomes or other relevant outcomes, and (II) includes ongoing efforts to examine the effects of such activity, strategy, or intervention. (p. 2)

With the passage of No Child Left Behind Act of 2001, educators became required to use research to determine which teaching methods were scientifically proven to be effective for use in schools (Botts et al., 2008). The Every Student Succeeds Act (2015) upheld the mandate for the use of evidence-based practices when providing interventions and supports to students. This mandate was implemented to ensure the effectiveness of the interventions being used in classrooms as these practices have been vetted using multiple studies to ensure their effectiveness (California Department of Education, 2019). By ensuring practices implemented are supported by empirical research the use of ineffective and costly interventions can be prevented (Horner et al., 2005). The purpose of evidence-based practices is to improve student outcomes using methods proven to be highly effective through research findings (Torres et al., 2012).

There are many methods classroom teachers can use to increase on-task behavior that would be considered evidence based. Some examples include classroom management strategies, behavioral interventions, and sensory interventions.

Classroom Management Strategies

It is imperative that teachers effectively manage distracting and disruptive student behaviors in the classroom to prevent lost instructional time and maintain student engagement (Cooper et al., 2018). Effective classroom management strategies can be one of the most efficient approaches to managing behavior, sustaining engagement, and increasing positive student outcomes (Cooper et al., 2018; Flower et al., 2017; Gage et al., 2018).

There are many different evidence-based classroom management strategies. Typically strategies fall into one of the following categories antecedent-based, instructionally based, consequence-based, or self-management (Cooper et al., 2018). Some of the more common strategies used in the antecedent-based or prevention category include having a clear set of classroom rules and procedures, purposefully arranging the classroom environment, and having structured routines and schedules (Cooper et al., 2018; Flower et al., 2017). Instructionally based interventions include direct instruction, frequent positive and purposeful feedback, opportunities for student responses, effective lesson pacing, and giving students choices (Cooper et al., 2018). Interventions in the consequences category include behavior reports, classwide contingencies, planned ignoring, timeout from reinforcement, and token economies (Cooper et al., 2018). Self-management strategies include students monitoring their academic performance or target behaviors, setting goals and monitoring their progress, and providing self-reinforcement (Cooper et al., 2018; Flower et al., 2017).

Behavioral Interventions

In addition to using classroom management strategies to increase on-task and desired behaviors there are also behavior management interventions that can be used on a tiered basis (Zakszeski et al., 2020). Positive behavior intervention support programs were adapted from “practices, principles, and systems implemented by behaviorists in the early 1960s and 1970s” (Sugai & Simonsen, 2012, p. 4). These programs are a compilation of “behavioral theory, behavior analysis, and positive behavior supports” (Sugai & Simonsen, 2012, p. 4) and are intended to meet the needs of the majority of students in a school (Sugai & Simonsen, 2012).

Positive behavior support programs were developed to be multi-tiered intervention programs with the first level of the intervention being the universal or schoolwide tier (Sugai &

Simonsen, 2012). The schoolwide level is meant to “focus on intervention for all students in all settings” (McIntosh et al., 2014, p. 209). The next level of intervention is the secondary or targeted Tier 2 intervention level, which is for students who do not respond to the primary intervention level (McIntosh et al., 2014). These students are identified using a screening process to provide them with more specialized interventions on the secondary level (McIntosh et al., 2014). The final tier is the tertiary or intensive Tier 3, which provides the most intensive level of support and is used for students who do not respond to either the primary or secondary levels of support (McIntosh et al., 2014). At this level of the program, students may undergo a functional behavior assessment, which is used to develop an intensive individualized behavior intervention plan that will meet their specific behavior needs (Martens & Andreen, 2013; McIntosh et al., 2014).

Sensory Interventions

Two specific sensory interventions are multi-sensory environments and movement interventions.

Multi-sensory Environments. Multi-sensory environments “are spaces designed to provide sensory stimulation to users through a range of visual, auditory, tactile, and olfactory equipment” (Carter & Stephenson, 2012, p. 95). The equipment found in these rooms can vary but sample items include “dimmed lighting, various colors, visual displays, fiber-optic lighting, projectors, tactile objects, bubble tubes, olfactory stimulants, equipment for sound production, and furnishing to relax on, such as floor cushions, and water or air beds” (Slevin & McClland, 1999, p. 49). Lotan and Shapiro (2005) elaborate further and explain those using the multi-sensory environment have control over the intensity of the sensory stimulation they receive to help them find balance and relaxation. The multi-sensory environment allows those with

disabilities a safe sensory environment that they can control and manipulate to investigate and explore the world around them with the support of a facilitator as students may not be able to set up their optimal environment independently (Lotan & Gold, 2009; Lotan & Shapiro, 2005).

The implementation and use of multi-sensory environments can be traced back to the Netherlands in the 1970s and 1980s (Grace, 2020). Researchers Hulsegge and Verheul first created a multisensory tent on the grounds of their institution which later became a room inside the building, as a place residents could seek the sensations they enjoyed and that calmed them (Grace, 2020). Hulsegge and Verheul trademarked the term “Snoezelen” for the name of the multi-sensory environment they had created for their patients with severe to profound disabilities (Botts et al., 2008). This multi-sensory approach became a way to provide leisure activities that promoted enjoyment and relaxation for those with disabilities by enhancing their sensations and emotions (Slevin & McClelland, 1999).

The use of multi-sensory environments evolved to be commonly used on an individual basis for therapeutic purposes (Lotan & Gold, 2009). However, the use of multi-sensory environments has become a practice in many school settings as a way to meet the needs of students with disabilities and teach appropriate behaviors that can be generalized to the environment outside of the sensory room (Carter & Stephenson, 2012). Sensory environments can be beneficial to children with disabilities because they provide close interpersonal contact, a quiet and reassuring environment for children that are easily agitated or anxious, and can promote relaxation (Lotan & Shapiro, 2005). It is thought that sensory rooms can be used to provide a reduction in distress, aggression, and stereotypical behaviors, as well as increases in motivation, concentration, and coordination (Botts et al., 2008).

Movement Interventions. The study and use of physical movement in the classroom have been conducted for both regular education and special education students in the past. According to Wild and Steele (2018) “movement is essential to optimize learning and achievement” (p. 748). Research on classroom movement interventions examined the impact of movement on engagement (Watson & Kelso, 2014; Weslake & Christian, 2015), increasing on-task behavior (Goh, 2017; Miramontez & Schwartz, 2016), improving attention (Schmidt et al., 2016), the health benefits (Masini et al., 2020), academic benefits (Maeda & Randall, 2003) and to address self-stimulatory or maladaptive behaviors (Liu et al., 2015; Mays et al., 2011; Wild & Steele, 2018). These interventions come in the form of specifically developed programs such as Brain Gym or GoNoodle, while other interventions are simply called “brain breaks” or “movement breaks.” Movement interventions can be infused with academics and incorporated into instruction or they can be standalone breaks used to provide students with a few minutes of activity (Webster et al., 2016).

Movement Breaks. Movement breaks or brain breaks can be referred to as movement integration when used in the classroom (Goh et al., 2018; Mullins et al., 2019). Movement integration has been defined as “physical movement at any intensity that is integrated with academic subjects either between or during instruction, or movement breaks without an academic focus in the classroom” (Goh et al., 2018, p. 103). The use of short intervals of movement in the classroom was found to be an effective method for engaging students and improving on task or attention to task behavior (Dillon et al., 2016; Goh et al., 2018; Mullins et al., 2019; Schmidt et al., 2016; Szabo-Reed et al., 2019; Wild & Steele, 2018) as well as decreasing disruptive behavior (Goh, 2017; Wild & Steele, 2018), allowing students a chance to refocus (Weslake & Christian, 2015), and may also have an impact on student motivation and

achievement (Mullins et al., 2019; Szabo-Reed et al., 2019; Weslake & Christain, 2015).

Integrating movement into the general education classroom has had an impact on reducing the self-stimulatory and stereotypical behaviors of students with disabilities (Dillon et al., 2017; Liu et al., 2015; Mays et al., 2011; Miramontez & Schwartz, 2016).

During movement children's brains are being stimulated, which can "increase levels of neurotransmitters that improve mood and focus" (Wild & Steeley, 2018, p. 748) and ultimately allows time for students to process and take the time they need to refocus on learning (Wild & Steeley, 2018). Children can have substantial difficulty remaining on task and focused for extended periods in the classroom, using a movement intervention or brain break at regular intervals during the day allows for students to take a break and refocus (Weslake & Christian, 2015).

Movement activities can be easily incorporated into the daily routine of students (Gawrilow et al., 2016). Typical movement interventions that happen between academic tasks can last anywhere from 5-15 minutes and may vary in intensity (Masini et al., 2020; Schmidt et al., 2016). Breaks may involve strictly physical activity or they may incorporate cognitive components (Schmidt et al., 2016). Movement breaks, or brain breaks, can be implemented by the classroom teacher in their existing classroom space without specialized equipment or programs (Masini et al., 2020). By incorporating movement breaks classroom teachers can refocus student's attention when they begin to become restless or unfocused (Mullins et al., 2019). Movement breaks can be helpful to keep them on task throughout instruction (Weslake & Christian, 2015).

Brain Gym. Brain Gym is a kinesiology program developed in the 1970s by educators and reading specialists Paul and Gail Dennison (Watson & Kelso, 2014). They developed the

program to increase focus and attention in an effort to improve academic skills (Watson & Kelso, 2014) through the use of 26 simple movements that are “believed to enhance academic and behavioral performance by activating both hemispheres of the brain through neurological repatterning to promote whole brain learning” (Watson & Keslo, 2014, p. 76).

The purpose of the Brain Gym program is to incorporate natural movement patterns to optimize learning (Breakthroughs International, 2018). The program’s theory is that “learning problems are caused when different sections of the brain and body do not work in a coordinated manner, thereby blocking an individual’s ability to learn” (Hyatt, 2007, p. 118). Hyatt (2007) explains the framework for the program is based upon three dimensions: (a) laterality, which is the coordination between the left and right hemispheres of the brain: (b) focusing, which is the connection between the front and back of the brain and is related to the ability to coordinate information as well as comprehend and focus one’s attention: and (c) centering, which is related to coordination between the top and bottom half of the brain and plays a role in balancing thoughts and emotions. The 26 simple movements in the program (Watson and Kelso, 2014) include crawling, drawing, tracing, yawning, drinking water, and breathing exercises (Hyatt, 2007). While none of the activities include the use of academic content, they are used to activate the brain to facilitate whole-brain learning and enhance the educational experience of the child (Hyatt, 2007).

GoNoodle. GoNoodle is a web-based program that was created in 2013 to promote movement activities that can help boost a student’s mindfulness, focus, engagement, and prepare them to learn through the use of interactive brain breaks (GoNoodle, n.d.; GoNoodle, 2020). The free videos on the GoNoodle site are designed to provide students with opportunities to move, learn mindfulness skills, and manage their emotions (GoNoodle, 2020). The GoNoodle activities

are intended to be fun, engaging, interactive (Whitney, 2016) and take approximately 3-5 minutes of class-time per video (GoNoodle, n.d.). The activities are meant to provide enough time for students to get their minds re-engaged without taking away too much instructional time (GoNoodle, n.d.). GoNoodle (2020) lists some of the benefits of their platform as fewer behavioral incidents among children, an improvement in student confidence, helps develop better peer-to-peer interactions, and can help boost student productivity. According to their research, their program has provided a 37% decrease in classroom disciplinary events and helped improve math scores by as much as 50% (GoNoodle, 2020).

Sensory Paths. Some forms of movement that can help children refocus include jumping, hopping, pushing and pulling, swinging, and applying pressure to their bodies (Mays et al., 2011). Many of these movements can be recreated through the use of a sensory path and can also incorporate academic elements at the same time (The Sensory Path, 2020). Sensory paths are colorfully designed vinyl stickers that are applied in a pattern to a given location (The Sensory Path, 2020). They can be applied in a predetermined pattern or the pattern can be adjusted to meet the needs of the users (The Sensory Path, 2020). The components of the paths incorporate different movements, such as walking, jumping, balancing, pushing, hopping, and spinning (The Sensory Path, 2020). The movements incorporated in sensory paths were designed specifically to help students release tension and energy which will allow their bodies and minds to be refocused (The Sensory Path, 2020).

Teachers Knowledge of Evidence-Based Practices

Preservice Teacher Preparation Programs

Within the last several years there has been a strong push to educate students in their LRE, which is most often the inclusion setting in a general education classroom (Byrd &

Alexander, 2020). It is more important than ever, therefore, that teachers are prepared to meet the needs of these students in their classroom, which begins with ensuring both general and special education teachers have the training necessary to meet the needs of the students (Byrd & Alexander, 2020).

Teacher preparation programs can help to not only increase a teacher's knowledge of students with disabilities but can also help shape their attitudes toward students with disabilities (Stites et al., 2020). Preservice teachers who have limited knowledge or experience working with students with disabilities may also have a negative outlook toward these students, which can lead to limited success for the students (Taylor & Ringlaben, 2012). Teacher preparation programs can help enhance both the knowledge and the attitudes of preservice teachers by providing multiple opportunities to learn about and interact with students with disabilities (Taylor & Ringlaben, 2012).

When examining courses offered by universities to general education and special education preservice teachers, less than 50% of programs offered courses to general education majors in the areas of increasing appropriate behavior and behavior reduction (Flower et al., 2017). However, approximately 80% of universities offered courses in increasing appropriate behavior, and approximately 70% offered courses in behavior reduction for special education majors (Flower et al., 2017). In a study of elementary education programs in the United States, it was reported that "84% of programs dedicated less than 75% of a single course to classroom management" and covered less than half of the strategies supported by research (Poznanski et al., 2018, p. 303). When examining preservice teacher preparation courses in one state in the southeastern United States, Moore et al. (2017) found that 47.5% of preservice teachers took a course specific to classroom management and only 28.2% of respondents received feedback

related to implementing classroom management strategies during their school-based practice. Preservice teachers in general education programs have less training in classroom and behavior management strategies than their special education counterparts, but students with disabilities often spend substantially more time in the general education classroom as it is their LRE (Scott, 2017).

Another way to increase the exposure to effective practices is for universities to provide preservice teachers with authentic inclusion experiences in actual classrooms (Stites et al., 2020). Universities can ensure preservice teachers have had opportunities to see effective inclusion practices in action, which can better prepare them for their own teaching experiences through their practicum, internship, or student teaching placements (Stites et al., 2020).

There is a promising teacher education program redesign effort happening in which general education and special education teachers pursue their degrees by taking a shared set of courses that would ensure all teachers are prepared to teach any type of student (Blanton et al., 2011). This integrated programming could revolutionize teaching and help prepare teachers to work with not only the most challenging of general education students but also students with disabilities (Blanton et al., 2011). While this model could be beneficial in preparing all preservice teachers to work with all students it has not yet been adopted by a large number of teacher preparation programs.

Professional Learning Opportunities

Professional learning opportunities are planned learning events designed to increase teacher effectiveness in their specific roles to ultimately help students achieve at a higher rate (Learning Forward, 2020b; Van der Klink et al., 2017). Professional learning opportunities are the most common form of ongoing teacher education used today (Learning Forward, 2020b).

Professional learning opportunities should be well rounded, classroom-focused, data driven, and focused on increasing teacher's knowledge of the content they teach (Learning Forward, 2020a). They should also be focused on increasing positive student outcomes, meeting individual teacher needs, focused on classroom management or evidence-based instructional strategies, or meet the needs of the school or the school district (Learning Forward, 2020a). The conventional method for delivering professional learning opportunities is through half-day or full-day meetings used to cover a targeted area or particular teaching method and there is typically no follow-up related to the actual implementation or success of the strategy (Shaffer & Thomas-Brown, 2015).

With the rise in inclusion rates teachers often report that they feel unprepared to meet the needs of students with disabilities that may be in their classrooms (Shaffer & Thomas-Brown, 2015; Taylor & Ringlaben, 2012). Teachers have consistently reported that another area of need is classroom management, as this can be important in regard to managing the behavior of students with and without disabilities (Cooper et al., 2018; Peterson-Ahmad et al., 2018). According to Cooper et al. (2018), less than 50% of teachers surveyed reported opportunities to participate in professional learning related to classroom management and 62% of teachers reported it was not a useful learning opportunity when these sessions were available.

Professional learning opportunities can play an important role in the implementation process of interventions and innovations (Frank et al., 2011). A teacher's ability or willingness to implement a new intervention or practice can depend on their knowledge base (Frank et al., 2011). Since innovations are not typically part of a teacher's core training, Teachers are usually exposed to information about innovations during professional learning opportunities and not as part of their preservice training (Frank et al., 2011). Teachers that can attend professional learning opportunities related to a particular practice or intervention are more likely to use that

practice in the classroom (Frank et al., 2011). Teachers are even more likely to gain knowledge of how to implement an innovation when they have had opportunities for “hands-on learning” (Frank et al., 2011, p. 139).

In one study of 25 elementary school teachers across 10 districts, Frank et al. (2011) examined whether teacher’s level of knowledge and exposure to innovation-specific professional learning increased their level of implementation. The researchers focused on professional learning offerings that were related to technology innovations that could be used in elementary schools. The researchers collected data using surveys, interviews, and observations of the professional learning offerings in each of the school districts (Frank et al., 2011). Many of the survey items were based upon self-reported data regarding the professional learning (Frank et al., 2011). Two covariates were used in their analysis: (a) teacher's perception of technology, as that can impact how beneficial the professional learning is, and (b) seeking help from others to learn about technology, as that may lead to an increase in their use of technology (Frank et al., 2011). Frank et al. (2011) used a regression analysis to determine if the participant’s initial level of knowledge played a role in the implementation of the innovation after the professional learning. The results indicated that teachers with low levels of implementation knowledge only used the technology 31 times during the first year of their study, teachers with intermediate knowledge were found to use the technology 101 times throughout the first year, and teachers with high levels of implementation knowledge used the technology 319 times throughout the year (Frank et al., 2011). The authors reported a need to match a teacher’s knowledge source of implementation with the appropriate level of professional learning, as this alignment plays an important role in how successfully an innovation may be implemented effectively after the professional learning (Frank et al., 2011).

According to Frank et al. (2011), their research suggests a three-part evolution in how knowledge is shared within organizations can be beneficial to the implementation of innovations. First, teachers should learn the basics from an outside source or expert (Frank et al., 2011). Second, this knowledge is then diffused within the organization and experimented with and adapted to fit the needs of the context within which it will be used (Frank et al., 2011). Third, teachers should interact and share how they may be using the innovation in content-specific ways to further develop understanding and additional uses for the innovation (Frank et al., 2011).

Both veteran and novice teachers must be well versed in evidence-based practices (e.g., instructional delivery, classroom management) that can be used in the classroom to meet the needs of all learners. The implications of teachers lacking in these skills can lead to an increase in off-task student behavior that can ultimately lead to a loss of quality instructional time (Flower et al., 2017). When teachers are well prepared and have continuous professional learning opportunities, they are able to “set clear expectations and manage their classrooms to maximize learning time subsequently demonstrating greater increases in student achievement” (Flower et al., 2017, p. 163).

Program Implementation and Evaluation

It is important to be knowledgeable regarding the evidence-based practices available at the classroom and school level but it is also imperative school level leaders know which practices to implement to meet the needs of the students in their schools. Rogers (2003) explains the diffusion process is the process through which an innovation is disseminated over time throughout an organization. In school organizations, this process can be rushed along based upon the demand and need for the innovation (Morrison et al., 2019). Change agents in an

organization can move the process along by removing obstacles and convincing others in the organization of the need for innovation (Morrison et al., 2019).

According to Rogers (2003), the five-step process one follows when making decisions related to implementing innovations is: knowledge, persuasion, decision, implementation, and confirmation (Rogers, 2003). The knowledge stage is when an individual learns about an innovation's existence and how it works (Rogers, 2003). The persuasion step in the process involves one forming an attitude toward the innovation, which then leads to the decision phase when one participates in activities that lead up to the choice to adopt or move on from the innovation (Rogers, 2003). In the implementation phase, the innovation is adopted and put to use (Rogers, 2003). Finally, in the confirmation stage of the process one seeks confirmation that the innovation was effective if found not to be it could be abandoned (Rogers, 2003).

The adoption of innovations, specifically technology resources, to improve student achievement has expanded at an exponential rate in our schools (Morrison et al., 2019). This expansion means districts are allocating and spending funds at a rapid rate to purchase and adopt these technological innovations (Morrison et al., 2019). Morrison et al. (2019) conducted a study to examine the procurement and decision-making process of school districts when purchasing educational technology tools. The researchers wanted to examine the district's overall process from allotting funding, assessing needs, discovering which products to acquire, evaluating the quality and effectiveness of the products, to the final acquisition of the selected products (Morrison et al., 2019). A mixed methods research design included collecting data through surveys and interviews from varying stakeholders in the district as well as program vendors (Morrison et al., 2019). Through their surveys and interviews, the researchers ultimately found the decision-making process to be incomplete only partially achieving the goals of the

stakeholders when it came to the procurement of educational technology tools for the district's schools (Morrison et al., 2019).

Data-based decision making, also referred to as data-driven decision making, is the process of using data and evidence to make educational decisions that will help inform and guide those making educational decisions (Mandinach & Schildkamp, 2020). This process has come about recently due to a shift in educational policy that includes accountability measures that emphasize continuous improvement and means an increased push to continually adapt the learning environment to better facilitate meaningful learning for all students (Mandinach & Schildkamp, 2020). Along with the shift in educational policy has come a more aggressive form of program adoption and implementation moving from the “let it happen or help it happen” (Fixsen et al., 2009, p. 533) approach to a “make it happen” (Fixsen et al., 2009, p. 533) implementation method. Research has shown that effective programs can be implemented poorly and ineffective programs can be implemented well but to achieve desired outcomes effective programs should be implemented well (Fixsen et al., 2009).

Multi-sensory rooms gained popularity in the late 1980s and began to be installed not only in residential facilities and specialized schools for children with disabilities, but also in traditional schools in Great Britain (Bozic, 1997). When multi-sensory rooms were integrated into traditional school settings, their use shifted from simply a place for the user to explore the environment to being more educationally driven and incorporating more educational aspects (Bozic, 1997). The new use of multi-sensory rooms prompted Bozic (1997) to conduct a qualitative study to determine what school staff perceive to be the purpose and meaning behind the multi-sensory rooms in their schools.

Bozic (1997) found the multi-sensory environments they examined had been adapted and were being used in one of two ways. First, the child-led repertoire in which students used the room as a calming and relaxing place. They can choose the activities they wanted to participate in for enjoyment (Bozic, 1997). The second use was the developmental repertoire in which the rooms were used as a stimulating and motivating place for children to go where they can concentrate and complete work (Bozic, 1997). The activities are tailored to the needs of the students and the decision-making process is not necessarily left up to the student while in the room (Bozic, 1997).

According to Bozic (1997), it appears the main purpose of multi-sensory rooms was still to be a calming and relaxing place for students, and while some teachers indicated an academic purpose overall that was not the main focus or intent of the rooms in most schools. The purpose of the room even varied in that teachers in the same schools may be using it for a different purpose depending on the needs of their students (Bozic, 1997).

As part of a larger study, Carter and Stephenson (2012) surveyed teachers at 36 schools in Australia to determine how and why multi-sensory environments are used in schools. The researchers were looking to determine if multi-sensory environments should be regarded as an evidence-based intervention due to their increasing popularity in many countries (Carter & Stephenson, 2012). Their study expanded upon research conducted by Bozic (1997) in which he examined the use of multi-sensory environments in Great Britain and Botts et al. (2008) who studied the use of multi-sensory environments in the United States. Analysis of the surveys showed that the most common reasons schools identified for establishing a multi-sensory room in their schools were due to the benefits described by other teachers (73.7%) and the appeal of

the multi-sensory approach (73.7%) while only (31.6%) of respondents, however, based their reasoning on actual research evidence about the efficacy of the intervention.

Botts et al. (2008) examined five empirical articles to determine the efficacy of multi-sensory rooms for reducing self-stimulatory, stereotypical, or aggressive behaviors in those with disabilities. The authors found the conclusions in the five studies to be weak and inconsistent (Botts et al., 2008). There were some data to suggest a possible reduction in the target behaviors but, due to the research designs, the researchers could not determine if this reduction was due to the Snoezelen equipment in the multi-sensory rooms (Botts et al., 2008). Botts et al. (2008) noted that often interventions such as the multi-sensory room are adopted as an evidence-based practice used to comply with the mandates outlined in the No Child Left Behind Act but suggests that further research is imperative to ensure the efficacy of these interventions (Botts et al., 2008).

Fixsen et al. (2009) conducted an exhaustive literature synthesis for the National Implementation Research Network which provides recommendations for policymakers as well as practitioners and the following is findings relevant to this review of the literature. When a school or teacher decides to implement a new program, the goal is to have teachers use the innovation effectively and to support this there are key components known as “implementation drivers” that influence staff and organizational culture (Fixsen et al., 2009): staff selection, preservice, and inservice training, ongoing coaching and consultation, staff evaluation, decision support data systems, facilitative administrative support, and systems interventions (Fixsen et al., 2009). These components are interactive and cyclical as they work to compensate for the strengths and weaknesses of each of the components (Fixsen et al., 2009).

The process of effective implementation begins with selecting the staff that is qualified to carry out the innovation, preservice, and inservice training are then provided to those who will use the innovation (Fixsen et al., 2009). Once the innovation is implemented, ongoing coaching and consultation are provided to give advice and encouragement throughout the implementation process (Fixsen et al., 2009). Evaluations should be completed to help the teacher improve their practice and performance outcomes and performance data should be analyzed to continue to assess the innovation's implementation and effectiveness over time (Fixsen et al., 2009). The facilitative administration step in the process provides overall leadership and uses data to make informed decisions in regards to the innovation and the implementation process (Fixsen et al., 2009). Finally, the systems interventions are methods and strategies used to ensure the availability of resources needed to support teachers and their use of the innovation (Fixsen et al., 2009).

Webster et al. (2016) conducted a qualitative research study examining 12 teachers' perceptions related to the adoption and implementation of a movement integration program in four elementary schools. The researchers wanted to determine if teacher perceptions and experiences played a role in the success of the school's implementation process. The survey included demographic information and self-report items such as the amount of time they integrated movement into their instruction. The researchers purposively selected participants who reported minimal use of movement in their classrooms so that the intervention had the potential to show larger increases in movement and provide feedback on the process of implementation (Webster et al., 2016). Twelve teachers participated in the surveys and individual interviews, which focused on the teacher's perceptions of advantages and disadvantages of movement integration as well as barriers and supports to implementing

movement integration. Using thematic analysis, Webster et al. (2016) identified four major themes that included barriers to movement implementation (e.g., logistical problems, knowledge and beliefs, student issues), current and ideal resources (e.g., school climate, teachers' positive beliefs about movement integration, student responses to movement integration), current implementation processes, and teachers' ideas and tips for movement integration. The researchers concluded that, when diffusing an innovation that may not be widely known among those expected to effectively use it, there should be preparation before the adoption that (a) shares policies, (b) presents a strong rationale for the innovation, (c) provides examples of effective use and motivation, and (d) outlines the possible benefits and successes that come from effectively using the innovation (Webster et al., 2016). Program adopters would, therefore, be more likely to see success when implementing new programs as they would have spent time building the buy-in of those expected to implement and use the innovation or intervention (Webster et al., 2016).

Implementation Supports and Barriers

Rogers (2003) states "implementation occurs when an individual puts an innovation to use" (p. 179). After the decision is made to adopt an innovation the next step is implementation and one of the biggest issues that arise during this process is how to use the innovation (Rogers, 2003). Implementation barriers are more likely to occur when an entire organization is adopting innovation rather than just an individual because there are more individuals involved in determining how and when to use the innovation (Rogers, 2003). Many times innovations are adopted by imitating them exactly as they were used by previous adopters, which can be a barrier to implementation as exact replication may not meet the current needs of the individual or organization and would need to be re-imagined or re-invented to meet the needs of the adopter

(Rogers, 2003). According to Rogers (2003) “innovations are only important if they continue to be used” (p. 183). Innovations are more likely to be met with resistance or fail if they are perceived as not meeting the needs of the population where the innovation is being used (Rogers, 2003). The adaptability of the innovation to the environment is a key factor in its sustainability (Rogers, 2003). Once an innovation is in the confirmation stage, questions or concerns that may have created dissent are put to rest through important supportive information (e.g., positive messages, examples of success) being shared with those that have experienced any degree of dissonance (Rogers, 2003).

Program Evaluation

Once an innovation is implemented there must be a plan in place to evaluate the effectiveness of the adoption and implementation process (Carroll et al., 2007). One type of program evaluation is known as process evaluation (Baranowski & Stables, 2000). A process evaluation looks at the variability of implementation to infer the effectiveness of the implementation components (Baranowski & Stables, 2000). Not only is the purpose of process evaluation to ensure planned activities are carried out but also to determine whether the plan needs to be adjusted or revised (Zhang et al., 2011). The process evaluation practice can be comprised of multiple components but this section will focus on five of those possible components: project implementation, context, participant responsiveness, adherence, and dose.

Project or program implementation is a part of the evaluation process that monitors the extent to which the program was implemented as designed (Baranowski & Stables, 2000). According to Dusenbury et al. (2003), there are four key elements to a successful project: (a) planning the program to be responsive to the participant's needs, (b) training tailored to the

implementation site, (c) enough participants to provide support for the project implementation, and (d) materials that are designed and developed to meet the target audience.

Context is another component of the project evaluation process (Baranowski & Stables, 2000). Before implementing a project or program the environment in which it is going to be implemented needs to be examined as it may play a role in the success of the program. Factors to consider include the potential targets of the intervention, the generalizability of the program, and the possible effects it may have. The complexity of the intervention can also play a role in how successful it is (Dusenbury et al., 2003). Dusenbury et al. (2003), explain that when “interventions consist of many elements that require special skill and that require coordination by many people, they are less likely to be perceived as effective and to be continued by those who use it” (p. 250). Programs that are simplified with clear and explicit instructions are far more likely to be viewed as having the potential to be successful (Dusenbury et al., 2003).

Participant responsiveness is explained by Dusenbury et al. (2003), as “the extent to which participants are engaged by and involved in the activities and content of the program” (p. 244). Participant participation or responsiveness to the intervention is typically assessed using self-reporting measures to evaluate how the participants viewed their participation in the intervention and their knowledge level in regards to intervention components (Dusenbury et al., 2003).

Examining measures of fidelity, such as adherence ensures a program is implemented as designed by the individual or organization (Carroll et al., 2007). Adherence can be defined as “the extent to which implementation of particular activities and methods is consistent with the way the program is written” (Dusenbury et al., 2003, p. 241). As many interventions are comprised of essential and non-essential elements, measuring adherence can determine which

components are critical and ensure they are taught well and monitored, not only by an outside observer but also monitored through self-reporting by those using the intervention (Dusenbury et al., 2003).

Another quality indicator for the successful implementation of a project is dose, or the amount of time a participant is exposed to the program or intervention, which is commonly measured using self-report (Dusenbury et al., 2005). The amount of time that participants are exposed to a given intervention can play a crucial role in the success of that intervention (Dusenbury et al., 2003). Similarly, a program that is not used with the frequency and duration prescribed could be rendered ineffective (Carroll et al., 2007).

Summary

Using Roger's (2003) diffusion of innovations theory, this literature review examined reasons as to why innovations may be adopted in classrooms to keep up with the ever-changing education world. The educational world is changing in not only the type of students being educated in public schools but laws and regulations governing their education have changed as well (Every Student Succeeds Act, 2015; IDEIA, 2004). These changes have led to an increase of students being educated in the general education setting as it is often deemed the student's LRE (Heward, 2013).

With the increase in students with disabilities being educated in the general education setting (National Center for Educational Statistics, 2020) educators are responsible for being prepared to meet the varying needs of their students as well as keeping them all on-task and engaged throughout the day (Godwin et al., 2016; Goh, 2017). This means they need to be well versed in what evidence-based practices are and those that may be beneficial to them as classroom teachers (Cook et al., 2012; Dillon et al., 2017). Some of the most common types of

evidence-based practices used to meet the needs of students with disabilities in the classroom include classroom management interventions, behavioral interventions, and sensory interventions (Cooper et al., 2018, Slevin & McClelland, 1999; Sugai & Simonsen, 2012; Watson & Kelso, 2014).

For teachers to be successful in implementing these evidence-based strategies in their classroom they must receive both preservice and inservice training to educate themselves with current practice and keep up to date with new and innovative practices (Taylor & Ringlaben, 2012; Shaffer & Thomas-Brown, 2015). As innovations and interventions are diffused and adopted throughout the educational world school-level leaders and teachers need to ensure that not only are the programs they adopt evidence-based (Botts et al., 2008) but are implemented effectively (Fixsen et al., 2009). Finally, once a program is adopted there also needs to be follow-up to ensure the program's effectiveness over time (Carroll et al., 2009).

According to the Every Student Succeeds Act (2015), interventions adopted by schools should be supported by research-based evidence supporting their use in schools. However, with how quickly innovations are being developed and diffused (Morrison et al., 2019) among potential users there could be interventions being implemented sooner than they should be which could be detrimental to schools as many times these programs or interventions can be costly to purchase (Carter & Stephenson, 2012).

Chapter III

Method

The purposes of this study are to describe (1) the decision-making processes of elementary school personnel related to acquiring and implementing a sensory path intervention, (2) the perceptions and uses of a sensory path related to student behavior and (3) the supports and barriers of elementary school personnel in implementing a sensory path intervention. This chapter describes the context of the study, the research design, the participants, the measures and instruments, procedures for participant recruitment, data collection, and data analysis, as well as a discussion of the trustworthiness and credibility of the researcher and the researcher's reflexivity statement. The constructs, instrumentation, data collection, and analysis measures were aligned with the research questions, as indicated in the summary matrix (see Appendix A).

The research questions that guided this study are:

1. What were the decision-making processes of administrators and teachers regarding the acquisition of a sensory path intervention?
2. What do administrators and teachers perceive as the uses and efficacy of a sensory path intervention in moderating students' on-task behavior?
3. What do administrators and teachers perceive as supports and barriers to the effective use of a sensory path intervention?

Context of the Study

This study was conducted in a single public school district in Middle Tennessee. The population of the county is over 200,000 individuals, which makes it the seventh-largest school district in the state. Part of the county is also made up of the fifth-largest city in the state. There is a major military installation located near the district and the district serves many of those military

families. There is also a state university in the heart of the county with over 11,000 students currently enrolled. The majority of the public schools are located within the city limits, however, nine of the district's schools are located outside the city limits in the county. The district has 24 elementary, seven middle, and seven high schools with over 5,100 employees, and over 36,000 students. See Tables 1 and 2 for demographic information.

Table 1

School Demographics

School	Total Students (N)	African American	Asian	Hispanic	Other	White
		<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)
A	701	48 (7.0%)	14 (2.0%)	49 (7.0%)	8 (1.0%)	582 (83.0%)
B	1100	341 (31.0%)	22 (2.0%)	180 (16.4%)	17 (1.6%)	540 (49.0%)
C	501	193 (38.5%)	18 (3.6%)	53 (10.6%)	9 (1.8%)	228 (45.5%)
D	800	288 (36.0%)	22 (2.8%)	140 (17.6%)	16 (2.0%)	334 (41.8%)
E	818	232 (28.4%)	29 (3.5%)	127 (15.5%)	30 (3.7%)	400 (48.9%)

Table 2

School Special Programs

School	Total Students (N)	Students with Free and Reduced Meals	English Language Learners	Students with Disabilities
		<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)
A	701	70 (10.0%)	0 (0.0%)	112 (16.0%)
B	1100	275 (25.0%)	34 (3.1%)	168 (15.3%)
C	501	220 (44.0%)	18 (3.6%)	73 (14.6%)
D	800	176 (22.0%)	16 (2.0%)	128 (16.0%)
E	818	168 (20.5%)	26 (3.2%)	125 (15.3%)

Five elementary schools were chosen as potential study sites because each had adopted a sensory path in their school within the past 5 years.

School A is located in the northeast section of the county outside of the city limits. It serves approximately 701 students in preschool through fifth grade. The demographic breakdown of School A is 7% African American, 2% Asian, 7% Hispanic, 1% self-identify as Other, and

83% White. Only 10% of their students qualify for free and reduced meals. Students with disabilities constitute 16% of the student body, and 0% of students are identified as English language learners.

School B is located near the middle of the county within the city limits. This school is one of the largest elementary schools in the district serving approximately 1100 students in preschool through fifth grade. The demographic breakdown of School B is 31% African American, 2% Asian, 16.4% Hispanic, 1.6% self-identify as Other and 49% White. School B is a Title I school with 25% of students qualifying for free and reduced meals. Students with disabilities constitute 15.3% of the student body, and 3.1% of students are identified as English language learners.

School C is located near the downtown area of the city, which is also near the center of the county. School C was designated a magnet school in 2004 with an increased focus on programs related to math, science, and technology. This school serves approximately 501 students in kindergarten through fifth grade. The demographic breakdown of School C is, 38.5% African American, 3.6% Asian, 10.6% Hispanic, 1.8% self-identify as Other, and 45.5% White. This school is a Title 1 school with 44% of students qualifying for free and reduced lunch. Students with disabilities constitute 16% of the student body, and 3.6% of students are identified as English language learners.

School D can be found in the north-central part of the county and is less than three miles from school B. This school serves approximately 800 students in preschool through fifth grade. The demographics breakdown of School D is 41.8 % White, 36% African American, 17.6% Hispanic, 2.8% Asian, and 2% that self-identify as Other. This school is a Title I school with 22% of students qualifying for free or reduced meals. Students with disabilities constitute 16% of the student body, and 2% are identified as English language learners.

School E is also located in the northeast section of the county within city limits. This school serves approximately 818 students in preschool through fifth grade. The demographic breakdown of School E is 28.4% African American, 3.5% Asian, 15.5% Hispanic, 3.7% self-identify as Other, and 48.9% White. This is a Title I school with 20.5% of students qualifying for free and reduced meals. Students with disabilities constitute 15.3% of the student body, and only 3.2% are English language learners.

Method

This study uses a fixed mixed methods research design, meaning that both quantitative and qualitative methods were determined to be the best methods before beginning the study. Quantitative and qualitative data both provide valuable and detailed information about a given problem but the information both provide can vary greatly (Creswell & Plano Clark, 2018). Mixed methods research is when at least one quantitative and qualitative research method or element is used together to tackle a research problem (Creswell & Plano Clark, 2018; Johnson et al., 2007). A mixed methods design can, therefore, provide a more complete picture by corroborating findings, collecting richer data, and initiating new methods of thinking (Creswell & Plano Clark, 2018; Johnson et al., 2007).

Both methods of research come with limitations that can be offset by pairing the two methods. For example, a small sample size makes it difficult to generalize quantitative findings to a larger population, and studying a larger population means it is more difficult to relate these findings to specific individuals (Creswell & Plano Clark, 2018). Quantitative methods are also weak in developing an understanding of the context and setting and the voices of the participants can be stifled (Creswell & Plano Clark, 2018). A major limitation

of stand-alone qualitative research is that it is difficult to generalize the research findings to a larger population (Creswell & Plano Clark, 2018). These limitations can be offset by using both methods of research (Creswell & Plano Clark, 2018).

After determining the research design, one of the next steps in the process is to determine the sequence of data collection, should one method be prioritized over the other (Creswell & Plano Clark, 2018). In this study, an explanatory sequential design was used (Creswell & Plano Clark, 2018). Explanatory sequential designs involve the sequential analysis of qualitative data to help explain the quantitative findings; quantitative analysis informs the collection and analysis of the qualitative data (Creswell & Plano Clark, 2018). Although the qualitative data was the primary source of data, the data collection process began with the quantitative data. The quantitative data also informed the participant selection for the qualitative data collection process. Quantitative and qualitative data were examined separately before being converged to interpret and analyze overall findings.

Participants

The population is the administrators and teachers at schools who have adopted a sensory path intervention within the last 5 years in one Middle Tennessee school district. The sample is administrators and teachers from five elementary schools. Five administrators participated in the survey and four of those administrators also took part in the follow-up interview. The fifth administrator declined to take part in the interviews as the sensory path had been purchased but not yet implemented at the school. Three out of the five administrators had 20 years or more of experience in education while the other two had between 16-20 years in education. All five of the administrators had at least 7 or more years of experience in administration. Only one administrator had a substantial amount of experience in special education and the amount of

years they had been assigned to their current school ranged from 0 years up to 12 years. See Table 3 for administrator demographics.

Table 3

Administrator Demographics

Administrator	Total Years of Experience	Years as an Administrator	Years of Special Education Experience	Years at Current School
A	20+	15+	0-3	7-9
B	20+	10-12	0-3	10-12
C	16-20	7-9	0-3	0-3
D	16-20	7-9	0-3	0-3
E	20+	10-12	10-12	10-12

Table 4

Teacher Demographics

Teacher	Total Years of Experience	Years of Special Education Experience	Years at Current School
A1	6-10	6-10	0-5
B1	6-10	0-5	0-5
B2	16-20	16-20	6-10
D1	6-10	0-5	0-5
D2	6-10	0-5	0-5
Z1	0-5	0-5	0-5
Z2	20+	16-20	0-5
Z3	0-5	0-5	0-5
Z4	0-5	0-5	0-5
Z5	6-10	16-20	0-5
Z6	0-5	0-5	0-5
Z7	11-15	11-15	11-15

Note: Teacher interview participants were labeled to match their respective school letter for teachers A-D. Teachers Z1-Z7 only participated in the survey and not the interview.

Twelve teachers completed the survey and of those teachers five also volunteered to complete the follow-up interview. The teachers experience levels ranged from 0 to 20 plus years of experience. A majority of the teachers had limited experience in special education while 5 teachers had 6 to 20 years of special education experience. All but two teachers had been at their

current school 5 years or less while the other teachers had been serving at their school between 6 to 15 years. See Table 4 for teacher demographics.

Instrumentation

Based upon the review of the literature and a similar study completed by Carter and Stephenson (2012), in which they examined the implementation of multi-sensory environments in Australian schools, the use of a survey and interviews was identified as the most beneficial means to collect data related to the research questions. The survey and interview questions not only aligned with the research questions, but also with the constructs being examined: decision making, implementation fidelity, implementation supports, and implementation barriers. The alignment can be seen in the research matrix (see Appendix A).

Surveys

Surveys created in the districts Google Suite version of Google Forms, were sent to the administrators of the schools identified as having sensory paths (see Appendix B). Surveys were also sent to teachers that have extensive experience using sensory paths with their students (see Appendix C). Both the administrator and teacher surveys were used to collect demographic data along with basic information related to the school's sensory path. The surveys were also used to find participants that would be willing to complete a more in-depth interview.

Interviews

Interview protocols were developed for both administrator interviews (see Appendix D) and teacher interviews (see appendix E) as the information each could provide would vary based upon their positions in the schools.

The purpose of the follow-up interviews was to provide the researcher an opportunity to ask more open-ended questions of the participants that could be used to answer the research

questions. Administrators and teachers were asked to explain when they first learned about sensory paths and to explain the role that they played in the acquisition process, both of which helped answer the first research question related decision-making processes. The next series of questions were targeted toward the participant's knowledge of the uses and perceptions of the usefulness of the sensory path in their schools. Administrators were asked to explain the initial intent of the sensory path and the population of students it was meant to target. Both teachers and administrators were asked about training that may have been provided to teachers and staff to ensure its appropriate use. The final set of questions asked about perceived barriers and support to the effective use of the sensory path and, therefore, helped answer the third research question. Participants were asked to share their thoughts on whether the sensory path was being used effectively as well as provide any insight into whether they felt there had been a change in student behavior that could be attributed to the use of the path. If they indicated that the path was ineffectively used, they were asked to share possible barriers to implementation.

Procedure

This section outlines the process by which participants were recruited, a description of the data collection tools and procedures, as well as the data analysis procedures.

Participant Recruitment

Once schools were identified, potential participants were sought. Participants included administrators involved in the decision-making process related to the acquisition and implementation of the sensory path intervention. Teachers were recruited to participate through snowball sampling. Snowball sampling is the process of recruiting an additional set of participants based upon information provided by the initial group of participants (Etikan et al., 2015). This process was utilized to find teachers who were considered the hidden population

Etikan et al., 2015); administrators gave suggestions for teacher participants based on the level of the teacher's students who used the sensory path.

The first step in recruiting participants was to determine which schools in the district had implemented sensory paths in the last 5 years. As part of the permission to conduct research approval (see Appendix H) process for the district the school district emailed all 24 elementary school principals to gather a list of schools that had implemented a sensory path within the last 5 years. The administrators reported by the district as having sensory paths were emailed a survey. The survey also asked administrators to identify teachers that used their school's sensory path regularly. These teachers were then sent a survey for completion.

After receiving a positive response to participating in the study, potential administrative participants were emailed the informed consent form to review and sign (see Appendix F). Teachers identified for participation were emailed the informed consent form at the same time they were sent the informational email and link to the initial survey.

Administrators and teachers willing to participate in interviews were identified in the surveys they completed. The four administrators who gave consent were accepted as interview participants; the fifth administrator did not consent as their school had not yet implemented the sensory path due to school closures. A select group of teachers were chosen to participate in a 20- to 30-minute interview to ask follow-up questions related to the sensory path and its use at their school. One to two teachers per school were selected as interview participants, based on their survey responses with the exception of School C which had no survey volunteers. One to two teachers at each school were selected as interview participants using intensity sampling, which Patton (1990) describes as information-rich cases that are an intense, but not extreme, manifestation of the phenomenon under study. The teachers who

used the sensory path most often, therefore, were asked to participate in the interview.

Data Collection

Survey. Based upon the list of schools provided by the school district surveys were sent to the administrators at schools with sensory paths using school email addresses. If the respondent was not there when the path was purchased, the previous administrator was invited to participate instead. The survey also asked administrators to identify teachers at the school locations with sensory paths that were having students regularly use the sensory path. These teachers were emailed surveys also. The teacher surveys collected demographic data as well as basic questions about the path. Teachers were also asked if they would be willing to participate in a 20 to 30 minute interview related to their student's use of the school's sensory path. The survey link was open for completion for one week and reminders were sent after day 5 and day 10 to anyone that had not yet completed the survey.

Interviews. Interviews were conducted virtually via videoconferencing software (i.e., Zoom) at a time convenient to the participants. Each interview session was audiorecorded using the Rev Recorder transcription application and the interviews were transcribed verbatim. Each interview took approximately 20-30 minutes to complete. To de-identify the interview data the student-researcher would label the recordings with the participant number (e.g. Administrator A, Teacher A) and school letter (e.g. School B) before sending them off for transcription. Administrators and teachers were labeled using the letter that matched their assigned school letter. When multiple teachers were from the same school they were labeled with the letter and a number (e.g. Teacher B1, Teacher B2). Teachers that only participated in the surveys were labeled with a letter and a number (e.g. Teacher Z1, Teacher Z2).

Data Analysis

Qualitative Analysis. Interviews and open-ended questionnaire items were coded using the in vivo coding method (Saldaña, 2016). According to Saldaña (2016), the in vivo coding method is an appropriate method for all qualitative studies especially those in which the researcher is a novice when it comes to coding as this method is beneficial to those learning to code. The in vivo coding process is also known as “literal coding” or “verbatim coding” meaning the codes are terms or words that come directly from the participant’s responses (Saldaña, 2016, p. 105). The in vivo method is more likely to capture the inherent meaning the participant is trying to convey in their responses (Saldaña, 2016).

After the first cycle of analysis for patterns, the codes were separated into categories based upon their recurring use within the data (Saldaña, 2016). When using the in vivo method, the categories should be created directly from the participants’ own language and “capture or summarize a major idea” (Saldaña, 2016, p. 200). After categorization was complete, the codes were mapped, which means the categories were broken down further into “central themes or concepts to bring meaning, structure, and order to data” (Saldaña, 2016, p. 218). The third time through the data the categories were condensed further and then subcategories were created, completing the first cycle of coding (Saldaña, 2016).

The goal of the second cycle of coding is to pare down, or narrow, the categories into a select few categories, which then become the major components to be focused on for analysis (Saldaña, 2016). The next step, focused coding, results in the most frequent or significant codes as the final categories and is “based on thematic or conceptual similarity” (Saldaña, 2016, p. 235). Once this process was complete, the final categories and subcategories were examined for further meaning (Saldaña, 2016).

Quantitative Analysis. The administrators and teachers at these schools were asked to

complete surveys in which they provided demographic information and answered a few questions about their school's sensory path. Likert scale survey responses were analyzed using descriptive statistics.

Trustworthiness and Credibility

The qualitative researcher is naturally invested in the line of inquiry they are following, which can cause consumers of research to question the validity of the work (Brantlinger et al., 2005). Therefore, the researcher must take measures to ensure their work can be considered reliable (Brantlinger et al., 2005). Multiple strategies can be used throughout the qualitative research process to ensure the reader can trust the research (Brantlinger et al., 2005).

The criteria most often used to evaluate qualitative research studies are credibility, transferability, dependability, and confirmability (Trochim, 2020). Credibility in qualitative research can only truly be determined by the participants in the study as it is through their perspective the believability or credibility can be determined (Trochim, 2020).

Transferability, or the ability to transfer findings from the study to a larger population can be increased by providing thorough descriptions of the research context to allow others to determine if the study could be replicated in other settings and contexts (Trochim, 2020). Dependability is ensured when the researcher provides details related to any changes that may have occurred during the research process that may have impacted the way the research was approached (Trochim, 2020). Finally, confirmability is the degree to which the results of a study could be corroborated and replicated by others (Trochim, 2020).

To enhance the credibility, transferability, dependability, and confirmability of my study I used the following strategies triangulation, researcher reflexivity, thick description, and particularizability. Triangulation is the process of finding consistencies among the various data

sources used throughout the research process and is a method used to increase credibility (Brantlinger et al., 2005; Liao & Hitchcock, 2018). Triangulation can be used in more than one way. First, it can be done by using various sources of data and data collection methods (Brantlinger et al., 2005). Multiple investigators or evaluators can be used as well as multiple theories to interpret the data or multiple methods can be used to examine a given data set (Brantlinger et al., 2005; Liao & Hitchcock, 2018). The data were triangulated by using multiple data sources (i.e., administrator and teacher surveys and interviews) and then comparing the sources. A cross-case analysis was completed by comparing the administrator and teacher data within and across school settings.

Another credibility measure is researcher reflexivity (Brantlinger et al., 2005; Liao & Hitchcock, 2018). Reflexivity is the process in which the researcher demonstrates self-awareness concerning how their background and experiences may influence the study (Brantlinger et al., 2005; Liao & Hitchcock, 2018). In the reflexivity statement, the researcher would disclose their “assumptions, beliefs, values, and biases” (Brantlinger et al., 2005, p. 201). I am including a researcher reflexivity statement to disclose assumptions, beliefs, values, and biases.

Using thick detailed descriptions to describe the research process, to present data, and the findings and conclusions are a way to not only provide credibility to the study but also ensure transferability to other contexts and settings and provides dependability for the study. The researcher will document cases using “thick description” so the readers will be able to visualize the research and determine if they will be able to transfer or generalize it to their situations (Brantlinger et al., 2005, p. 201). Detailed or thick descriptions of the participants being interviewed were used as well to ensure dependability and particularizability which is a

method of “documenting cases with thick descriptions so that readers can determine the degree of transferability to their own situations” (Brantlinger et al., 2005, p. 201).

Researcher Reflexivity

Due to the nature of qualitative research, the subjectivity of the researcher becomes intertwined with the research process (Ratner, 2002). The researcher must reflect on the objectives and values they bring to their research and how it may impact the outcome of the project (Ratner, 2002). The researcher should take a reflexive stance as to how they could ultimately frame the research process (Kang, 2020). For this reason, I need to disclose my role as the researcher and my positionality because the topic of this study was chosen due to the role I played as a special education teacher in my school.

My educational background is in special education. I have been a special education teacher since 2014 and I was the lead special education teacher in my building from 2018 through the March of 2021. As the lead special education teacher, I functioned as the department chair. It was my responsibility to lead the special education team as well as mentor new special education teachers in our school. I have also served as the chair of my school's Student Support Team since 2017. We discussed individual students' academic and behavioral needs, including suggesting classroom interventions and the need to be referred for a special education evaluation.

During the process of transitioning from writing this research proposal and beginning to collect research data, I accepted a new position within my school district. I transitioned into the role of a special populations consulting teacher with our special populations department at the district's central office. With this role, I work closely with the special education departments in 9 of our district's elementary schools. I am not a supervisor or an evaluator of

teachers with whom I interacted in this study. I have worked with special education teachers for the past 7 years but there was not any perceived or actual existence of coercion or undue influence as I am not a supervisor, evaluator, mentor, or instructor of the potential teacher participants.

The current study reflects my professional beliefs that interventions and supports are needed to support both general education and special education students with their ability to stay on task during instruction. I also have previous research experience studying the use of positive behavior intervention support programs as a means to positively impact student outcomes. It can be difficult for teachers to make time to provide individual supports that can be beneficial to keeping students on task. At times teachers can provide classwide breaks but this often is not enough for students who struggle with maintaining their attention. As a special education teacher, often tasked with finding solutions and supports for these types of issues I perceived a need for an intervention that would support students and increase their on-task behavior without adding to the classroom teachers' already full workload.

My role as a special education teacher and Support Team chair led me to research interventions that could be used to improve students' on-task behavior. One of the interventions I discovered was the sensory path movement intervention. This led me to focus the topic of my research on the acquisition and implementation of sensory path interventions in our local school system as well as their effective use on increasing the on-task behavior of students with and without disabilities.

Chapter IV

Findings

This study utilized a mixed methods design to provide a more complete understanding of the problem of practice. Qualitative data were gathered through individual interviews with administrators and teachers in schools with sensory paths. Quantitative data were collected through surveys completed by the administrators and teachers and were analyzed using descriptive statistics to supplement the qualitative analysis. Direct quotes from the interviews were used to present the qualitative findings. This chapter presents the findings gathered through surveys and interviews with administrators and teachers and is organized according to research question. Administrators and teachers are identified by school letter; teachers are identified with a number if more than one teacher participated at a school.

Decision Making and Acquisition (RQ 1)

Research Question 1 sought to understand the decision-making processes administrators and teachers followed when acquiring and implementing a sensory path intervention in their elementary schools. Survey and interview responses were analyzed to determine the process administrators and teachers followed when acquiring a sensory path. Many respondents noted that they first learned about the concept of sensory paths on social media platforms. Seeing the informational videos introducing the sensory path concept “started the conversation” (Administrator B) and piqued interest levels to acquire a sensory path in their schools. Sensory paths began to increase in popularity around 2018 (The Sensory Path, 2020) and administrators in this study reported first learning about sensory paths between 1 to 5 years ago. When asked how and when she first learned about sensory paths, for example, Administrator A said, “About 4

years ago; I don't recall where." Administrator B stated, "Definitely all last year, we were seeing things pop up in our personal lives, like on Facebook." Administrator C reported, "I learned about them probably 5 years ago." Administrator D said, "Last year I had some teachers bring them [sensory paths] up and ask if we could look into them. I then pulled them up on Pinterest to see what was out there." Although administrators indicated they may have learned about sensory paths up to 5 years ago, none were installed in their schools prior to 2019 (see Table 5).

Table 5

Sensory Path Acquisition and Decision Making: Administrators

	School A	School B	School C	School D	School E
Implementation Year	2019-2020	2020-2021	2019-2020	2020-2021	2021-2022
Change Agent	Principal	Leadership Team	PTO	Principal	Special Ed Teacher
Funding Source	School Funds	Educational Grant	PTO	School Funds	Educational Grant
Type of Sensory Path	Homemade	Pre-made	Pre-made	Homemade	Unknown

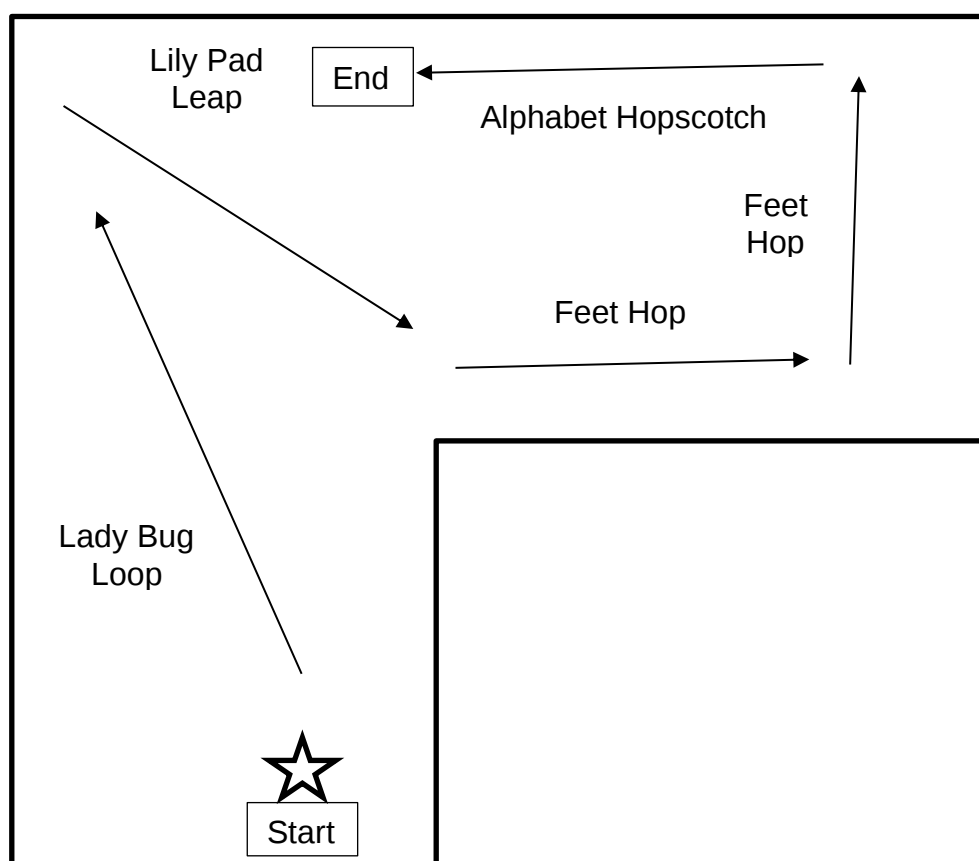
School A's sensory path acquisition was led by the administrator. She utilized school funds to purchase the sensory path and it was installed and implemented at the beginning of the 2019-2020 school year. In School B, a school-level leadership team [comprised of teachers from varying grades and areas] discussed the sensory path. The assistant principal with the help of a special education teacher then wrote an educational grant to secure the funds for the sensory path. School B purchased and implemented their sensory path using funds received from the educational grant at the beginning of the 2020-2021 school year. School C's administrator explained their school's PTO brought the idea of a sensory path to their administration team and purchased the path for the school (see Figure 1). It was implemented during the 2019-2020 school year. School D's administrator reported that she was asked by some of the special education staff if they could "look into" a sensory path. She then worked closely with her

bookkeeper to determine which school funds could be used to purchase a sensory path and how much they could spend; the sensory path was implemented during the 2020-2021 school year.

School E had a special education teacher present the idea to the administration team for approval before writing a grant to acquire the funds needed to purchase the sensory path. School E purchased their sensory path using the funds awarded from the grant during the 2020-2021 school year but decided to wait on implementation until the 2021-2022 school year due to concerns with COVID-19.

Figure 1

Sample Diagram of a Sensory Path Layout



Note: This is an example of how a sensory path might be laid out in the hallway of an elementary school building, as well as the direction a student would follow to engage with each component.

Figure 2*Images of Sensory Path Components*

Note: In this sample sensory path, students would hop from number to number on the daisy and then walk as if they are on a balance beam. Next, students would jump from frogs to logs, hop on top of the colorful footprints, and, finally, hopscotch to the end of the sensory path.

Teachers were also asked about the acquisition of the sensory path intervention for their school, in surveys and interviews. Much like the administrators' survey responses, the teachers reported first learning about sensory paths between 1 and 5 years ago. The teacher participants shared a few reasons why sensory paths caught their attention during the interviews. Teacher B1 said, "It immediately caught my attention as a way for some of my younger students to get some of their excess energy out or redirect them when they need a break." Other reasons were that the sensory path "allowed students to release" (Teacher D1), and "allows kids' movement, which helped them to take their mind off of whatever happened and de-escalate" (Teacher B2).

Table 6

Administrator's (N = 5) Reasons for Adopting a Sensory Path

Reason	%
Benefits described by other schools or teachers	100
Benefits described from online articles or videos	100
The appeal of the multi-sensory approach	80
Advertising for the product	60
Research evidence about the efficacy	40
Benefits described at a training or conference	40
Other	0

When administrators were surveyed about why their school purchased a sensory path, the most common reason selected was the benefits that had been described by other schools and teachers, and the benefits described in online articles and videos (see Table 6). Most administrators also selected the option noting that the multi-sensory approach was "appealing." The survey responses mostly aligned with the responses given in the interviews as to why schools chose to adopt the sensory path. During the interview process, most administrators indicated the idea of the sensory path came from other teachers or articles and videos found on social media. Administrators also mentioned that to some degree they were interested in how the sensory paths would meet the sensory needs of some students.

Table 7*Teachers' (N = 12) Reasons for Adopting a Sensory Path*

Reason	%
Benefits described by other schools or teachers	83
The appeal of the multi-sensory approach	83
Benefits described at a training or conference	83
Research evidence about the efficacy	83
Benefits described from online articles or videos	67
Advertising for the product	42
Other	25

Teachers were asked via survey to select the rationale for why their school chose to acquire and adopt the sensory path intervention. Responses varied with four reasons being selected the most often: benefits described by other schools or teachers, the appeal of the multi-sensory approach, benefits described at a training or conference, and research evidence about the efficacy (see Table 7). While teachers listed a wide array of reasons for adoption on the survey, during the interviews teachers mainly indicated they had seen it used in online videos or had seen or heard about sensory paths in other schools or from other teachers.

Table 8*Administrators and Teachers Decision-Making Processes*

Theme	Description	Sample Statements
Decision-making process and implementation were informal	No research or evidence-based information was gathered or examined before adopting and implementing	"I read something somewhere." "Things were popping up on Facebook." "I went to Pinterest to see what's out there." "It was just implemented haphazardly." "There is nothing formal about what we did." "I just barged ahead and did it." "I just said, I want this let's make it happen."
Acquisition targeted students with disabilities	Special Education students were the target population for the purchase	"We had two DPKs and a CDC and I thought it would be very useful." "Request from teachers and parents for some of our Sped students or ADHD students." "Students who need to release energy whether they are on an Individual Education Plan or not."

After analyzing the administrator and teacher interview responses related to Research Question 1, two major themes related to the acquisition and implementation of the sensory paths were (a) the decision making and implementation process were informal, (b) the acquisition was for students with disabilities (see Table 8).

Decision-Making Process and Implementation Were Informal

Decision-Making Process. When administrators were asked how they began to explore the decision to purchase a sensory path for their schools, it became clear this was an informal process in each school. Upon learning about the sensory paths, the administrators either moved ahead with acquiring the sensory path themselves or asked for additional input from staff at their schools to determine a funding source or what type of path to purchase.

All administrators reported playing a role in the acquisition process for their schools, however, their amount of involvement in this process varied. Each indicated that no matter their level of involvement, the approval ultimately came from them first before the faculty moved forward with purchases. When asked what her role was in the acquisition process, Administrator A said, “I did it. I thought it would be very useful for children. I just barged ahead and did it.” Administrator C was not as hands-on with the decision and reported that the PTO had offered to make the purchase. Her role was simply to “ensure it was in a great location.”

Administrators B and D indicated that it was a group effort in deciding to purchase the paths for their schools. Once School B learned they were approved for a grant their team “came around the table and just kind of decided to talk about what we have seen that we liked and what we could purchase” (Administrator B). School D received input from special education teachers in the building when discussing how acquiring a sensory path would benefit their students: “We have a couple of special education teachers who are really well-versed in sensory and how to

utilize sensory tools and they helped take the lead in helping decide what to purchase”

(Administrator D).

Three out of the five teachers that participated in the interviews reported they were not a part of their school's acquisition and decision-making process while the other two reported taking part in the initial discussions. Teacher B1 stated, “I brought the idea to my administrator and explained I wanted to write a grant to help fund the project.” Teachers A, D1, and D2 denied having a role in the acquisition process “I did not, but I have since offered suggestions” (Teacher A). When asked if they played a role in the acquisition Teacher D1 simply stated, “I did not” and Teacher D2 replied “No.” Teacher B2 explained that she was part of the team brainstorming ideas about what to include in the path and shared that she “was going to make the pieces on my Cricut [machine used to cut different materials like vinyl], but then admin [administrators] decided to go along with one that was pre-made.”

Implementation. During the administrator interviews, it was indicated that once the decision to acquire a sensory path was made there did not seem to be any intentional or formal planning related to implementing the sensory path for use with students. Administrator A said, “I just barged ahead and did it” and “it was just implemented haphazardly” referring to making the material purchase and installing the sensory path in her building without support from others.

The School B administrator stated she discussed the purchase with her student support coordinator and special education teachers to plan for what to purchase but indicated “there was nothing formal about what we did” (Administrator B). The School D administrator said that after seeing sensory paths on social media, she thought “I want this; let’s make it happen.” Before making the purchase, she consulted with special education teachers about what sensory path to purchase but not on how they would implement it in the school. While the implementation of the

sensory path may not have been well planned, the acquisition teams were certain of the population they wanted the sensory path to be utilized with.

Acquisition Targeted Students with Disabilities

Administrators reported the population of students they had in mind when deciding to purchase the sensory path for was their special populations students. Administrator A said, “We had two DPK [developmental pre-kindergarten] programs and a CDC [comprehensive development class], and I thought it would be very useful for them.” Administrator B reported it was examined for use with students “who have high need behaviors.” According to Administrator C, when the PTO brought the idea to her, there had been requests from parents and teachers to purchase the sensory path as a tool “for some of our Sped [special education] students or ADHD students.” Administrator D explained they wanted to utilize their sensory path with “students who needed to release some energy during class, whether they were on an Individual Education Plan or not.”

During the interview process teachers reported that the population of students the sensory path targeted were special education students or students with disabilities. Teacher A stated, “We wanted to use it for some of our students with autism or those with behavior issues.” According to Teacher B1, “When we wrote the grant, we wrote about our special education students or 504 students who might have ADHD as those that we would target with the sensory path.” Teachers B2 and D1 discussed using it with their special education students but did not indicate if they were the target population when the sensory path was acquired.

Summary

The purpose of Research Question 1 was to understand the process administrators and teachers followed when deciding to acquire and implement a sensory path intervention.

Administrators seemed to have good intentions with the purchase of the sensory path aiming to utilize the sensory path with their special populations students. The acquisition and implementation of the sensory paths were rushed to be able to quickly make the sensory paths available to these students as this approach was deemed to be “appealing” to not only the teachers but the administrators as well, according to survey responses.

Uses and Efficacy (RQ2)

Research Question 2 sought to determine what administrators and teachers perceive as the uses and efficacy of the sensory path in moderating students’ on-task behavior. After analyzing the administrator and teacher interview responses related to Research Question 2, two major themes emerged concerning the perceived uses and efficacy of the sensory path: (a) use expanded from the initial population, and (b) efficacy was informally determined (see Table 9).

Use Expanded to Other Populations

Administrator Perceptions of Use. During the interviews, administrators were asked if they implemented the sensory path for a specific purpose. The administrators indicated their sensory paths were being utilized for different purposes for different student groups, but the most common uses were to prevent negative behavior and a calm-down measure. Administrator A said, “I wanted us to be proactive in helping them [students with disabilities]. It has prevented us from having to take greater steps or disciplinary steps.” This was in reference to it being used as a calm-down measure with two children in particular that had difficult behaviors. According to Administrator B, teachers were also using it as a calm-down measure with students: “It’s a great way to calm them [students] down and start the conversation to figure out what’s going on with them.” School B was also using the sensory path as a preventative movement break: “Students were able to use the sensory path to get those wiggles out, to get them focused, and to get them ready to learn” (Administrator B).

Table 9*Administrators and Teacher Perceptions for the Uses and Efficacy of a Sensory Path*

Theme	Description	Sample Statements
Use expanded from initial population	Most often used to prevent negative behavior or as a calm-down measure for escalated students; students with disabilities were the intended population but has expanded to Tier 1 students	“used for calming our students” “We’ve used it for movement breaks.” “as a reward for gen ed [general education] students” “as a sensory or calm-down break” “It has expanded to our Tier 1 population.” “K-2 now use as well.” “All students enjoy using the sensory path.” “We now have other students without disabilities that use it.”
Efficacy was informally determined	Teachers and administrators reported changes in student behavior however, data were not collected to determine if using the path was effective as a preventative or calm-down measure	“We have seen it help calm and settle students.” “After use they seem much calmer.” “They are able to pay attention longer.” “It is a re-direction that helps.” “I have no hard data about how much they’re using it.” “We don’t collect any data to see if it’s working it’s just random observation.” “It’s just a matter of actually using it with students and seeing it working.” “I don’t think data is collected.”

Administrator C reported their sensory path was used as not only a preventative measure with special education students but also as a reward with general education students.

When we have a student [that] we see beginning to act out, we can take them on a sensory walk and it avoids and mitigates behaviors from escalating. Other [general education] students have enjoyed using it, too, so we began to use it as a reward so everybody had the opportunity to use it. (Administrator C)

Administrator D explained that, like schools B and C, their school was also using the sensory path as a preventative measure with students:

Our special education teachers use it as part of scheduled breaks to prevent negative behavior. We also have a buddy system [teacher paired with an at-risk student] in place

with students identified as potential behaviors [problems] and they utilize the path as something to do during their check-in time. (Administrator D)

She also indicated it was being utilized as a tool to help students calm down much like School A and B by stating that:

Some of them [students] cannot get outside their minds when they're in that setting [classroom] because they are hung up on what has happened in the classroom it's a great way for them to disconnect and reset while getting energy out before returning to the classroom. (Administrator D)

When asked if the use of the sensory path had expanded beyond the initial target population it was purchased for, three of the four administrators indicated that use had expanded. School A was the only school where the administrator indicated the sensory path use had not expanded. "Our CDC [comprehensive development class] students and DPK [developmental preschool] students use it but I don't think it has expanded beyond that." Administrator B said, "We purchased the path for our sped [special education] students but it has expanded to our Tier 1 [i.e., students on grade level] population as well in kindergarten and first grade." Administrator C stated, "All the students enjoy using the sensory path. So not only is it used for sped [special education] and students with ADHD challenges but as a reward for gen ed [general education] students." According to Administrator D, students with disabilities were the target population but "We have other students without disabilities that do use it regularly and so it's generally open to anybody in the building now."

Teacher Perceptions of Use. Teachers were asked via the survey to report the number of times their students used the sensory path daily and weekly. Ten out of the 12 respondents indicated they had students using their school's sensory path multiple times a day. Ten out of 12

respondents also indicated they had students using the sensory path multiple times a week (see Table 10).

Table 10

Teacher Report of Student Use of Sensory Path

Teacher	Number of Students on Roster	Multiple Times a Day	Once a Day	Multiple Times a Week	Once a Week
A1	3	3	3	3	3
B1	8	3	3	1	5
B2	18	9	2	5	9
D1	13	5	4	5	5
D2	20	1	1	1	1
Z1	10	3	2	3	9
Z2	0	0	0	0	0
Z3	14	1	3	3	8
Z4	0	5	0	3	0
Z5	10	5	0	3	1
Z6	15	3	3	3	2
Z7	20	0	0	0	0

Since teachers were actively using the path with students, they were able to elaborate a bit more about how they are using the path with their students. The teachers' interview responses as to how they were using the path with their students also corroborated to a degree the amount of time they reported in the survey using it per week and day with their students.

Teacher A explained she is a developmental preschool teacher, and they most often use the sensory path “to take kids who need a sensory break or time to calm down.” They also use it with their whole class “during times when we cannot go outside to give the students some movement time.” According to Teacher B1, she used it as “a preventative.” She explained:

I have a student that [sic] typically can’t sit through a whole group lesson I can take him for a break ahead of time to get some extra energy out and he is able to sit through the lesson longer than he was able to without the break.

Teacher B1 also explained she had used it as a calm-down measure with students:

It is a good way for them [students] to be redirected when upset. It gets them out of the classroom for a minute and gives them an outlet where they can calm down without having to talk or explain in that moment what is happening as that can lead to further escalation. After doing the path they have settled down and are ready to communicate.

Teacher B2 indicated her school was using the sensory path for students who need to take a break, de-escalate, or some that may just need a distraction. Using it with students who need to calm down “allows them to focus on certain things [components of the path] and not on what they were previously focusing on [reason for escalation] and calm down before returning to class” (Teacher B2).

Teacher D1 stated she used the sensory path with any of her students that [sic] need it.

She said: I use it as a preventative, as a reward for someone doing well, or to take a break if they are reaching the point of frustration. If I have a student working hard, he can select the sensory path as a reward.

Teacher D1 also explained she has “used it as a calm-down measure. Once escalated, I can remove them [student] from that [situation] and refocus them on the sensory path. I see a lot of de-escalation that way.”

Teacher D2 reported being a part of her school’s buddy system where she is paired with a student identified as high-risk for behavior issues that is in another grade level from hers. She indicated she uses the sensory path to take her buddy for a break during the day:

I also use it with him when he has a meltdown as a way to help him calm down. Going through the path helps to get his mind focused on something else and off the problem that he is having. He is then able to calm down and return to class. (Teacher D2)

Efficacy Was Informally Determined

Administrator Perceptions of Efficacy. Throughout the interviews, administrators indicated that their schools had no formal data collection process and that this was something they would like to improve upon moving forward. All four administrators shared that they were not currently using a formal method to determine if the sensory path was being used effectively to prevent negative student behavior. Administrator A reported they know if it has been effective, “In that moment.” Meaning, the teachers see it work when they are using it with a student. Administrator B said, “I think it’s important to always have the data. We haven’t yet talked about how we’re going to do it [collect data] but I think it definitely needs to happen.” Much like Administrator A, Administrator B indicated that the method they used to determine efficacy was informal and just based upon “random observation” by the adult accompanying the student through the sensory path. Meaning, if the student was observed to calm down or refocus, the sensory path was considered a success in that moment, but that success was not formally documented. Administrator C explained, “I think our sped [special education] teachers come up with their own protocols for how and when they choose to use it with students.” Administrator C did not report if any of those teachers were collecting data. According to Administrator D, “I have not seen it in IEP goals or behavior plans as a tool we would collect data on and we don’t have a tool to signal it’s being used to know how often it is being used.” She indicated “it is there for teachers to use when they need it with no formal processes in place.”

Regardless of not having any formal data collection to measure efficacy all of the interview participants reported seeing positive changes in student behavior. According to Administrator A, “it has helped in the management of some students” and has played a major role in helping one particular student with autism. It helps the student with autism “start to calm

down so she can recover and self-regulate.” Administrator B explained, “you can take a kid down the sensory path and they’re so much calmer.” It is also a “quick intervention that can be used when they’re getting a bit wiggly” (Administrator B). When asked if she would attribute any changes in student behavior, Administrator C simply responded, “Yes.” She went on to elaborate that it has helped students with sensory and anxiety issues “to get them out of a routine and non-preferred activity to an activity they prefer in order to get them back on track.”

Administrator D indicated that her school has a student that “we have seen some success with him being able to go down and utilize the sensory path to get himself reset before returning to class.”

Teacher Perceptions of Efficacy. The teacher’s responses when asked how the school was determining efficacy were again similar to the administrator responses. When asked how she knows if the path is being used effectively Teacher A1 simply said, “I don’t.” Teacher B1 indicated, “There weren’t any protocols developed as far as keeping track of data.” The only way School B is examining the effectiveness of the sensory path is “using it with the students and seeing it be effective with the students.” Teacher B2 said, “there is no clipboard near there [sensory path location] to pen down the date, time, or student using it.” Teacher D1 indicated she has heard “a lot of good things about it from different people [in her school]” but is not aware of any data that is being collected. To determine if the effectiveness of the path with her students Teacher D1 simply monitors “their demeanor and behavior overall before, during, and after use.” Teacher D2 explained her school did not have a formal data collection process and to tell if the sensory path was effective, she just tried to “observe if the student was having fewer meltdowns on the day he used the sensory path versus the days he did not use it.”

Much like the administrators, teachers that participated in the interview indicated they saw changes in student behavior among students who used the sensory path. Teacher A indicated she sees changes in student behavior reporting, “it can be a temporary fix at times” as she has a student that can use the path to calm down and “sometimes it works and sometimes it doesn’t.” Teacher B1 spoke about seeing it work with some younger students. “They are able to pay attention a little bit longer in class [when completed before instruction] or they’re able to calm down and refocus to get ready to enter back into the learning environment ready to learn” (Teacher B1). Teacher B2 thinks, “it helps some kids get those wiggles out by providing extra movement whey wouldn’t otherwise get.” When asked if she saw a change in student behavior Teacher D1 responded, “Absolutely!” She then elaborated with a student example “I have a student with high functioning autism that gets very overloaded, and I can see when he’s reaching a melting point. In that moment I’ll take him to the sensory path and just running it once and he is so much better and able to return to the classroom.” Teacher D2 said, “If they are having a meltdown and then they use the sensory path you will see a change in their behavior as they are re-directed and calmed down.”

Summary

The purpose of Research Question 2 was to determine what administrators and teachers perceive as the uses and efficacy of the sensory path in moderating on-task behavior. The administrators and teachers both indicated that the sensory paths were being used to prevent negative behavior and as a calm down measure with students. While the sensory paths were initial purchased for students with disabilities the use has expanded to the general education population as well in most schools. The administrators and teachers also indicated that while

there was no formal method to determine efficacy they felt they had seen positive changes in student behavior.

Supports and Barriers to Effective Use (RQ3)

Research Question 3 sought to determine what administrators and teachers perceive to be as supports and barriers to the effective use of the sensory path. After analyzing the administrator and teacher interview responses related to Research Question 3, three themes emerged related to the supports and barriers to the effective use of the sensory path: (a) sensory paths are worthwhile (b) implementation could be improved and (3) increased use with additional locations and components (see Table 11). The first theme was common among both the administrator and teacher responses while theme two was unique to the administrators and theme three was only among the teachers.

Sensory Paths Are Worthwhile

When asked what administrators thought was a support to the effective use of their school's sensory path a common theme that emerged was seeing the sensory path work with students was a support to use. Administrator A said, "They [teachers] see it works" in reference to what has supported her special education teachers using the sensory path with their students. Administrator C responded similarly saying "I think the benefits they get from the outcome of the students using the sensory path" have supported its use in their school. Administrator D reported a support in School D was having teachers speak to the special education teachers that use it effectively with their students. "We send them [teachers] to those teachers [regular sensory path users] as they are a resource and can recommend how to use the sensory path with students."

Table 11*Administrator and Teachers Perceptions of Supports and Barriers to Effective Use*

Theme	Description	Sample Statements
Sensory Paths are worthwhile (administrators and teachers)	Administrators and teachers report benefits from student use teachers seeing these benefits are a support, teachers perceive its ease of use and availability as a support, both administrators and teachers would recommend sensory paths to others	“They see it works!” “The benefits they get from the outcome on the students.” “We send them to those teachers [that use the sensory path] to recommend it be used.” “It’s availability and accessibility.” “It’s always there.” “Its availability is a key point.” “We have liberty to use it whenever we need it.” “Yes, definitely. I’ve seen it work with some of my students.” “Absolutely it’s something simple that can be done with the students.” “Good brain break area for students.” “Yes. We are looking to get another” “I would recommend it to every school.”
Implementation could be improved (administrators)	Administrators acknowledge a lack of training upon implementation on their part and would like to improve upon that as well as find a way to collect data to determine efficacy	“Lack of training on my part.” “They were only told who it was for” “We didn’t do that [training] I had sent out a video so they would know it was there and they could use it.” “Would like to learn from the implementation of others”
Increased use with additional locations and components (teachers)	Sensory path location was not in a common area that was easily accessible to all, adding more components or interchangeable components to increase effectiveness and appeal	“It’s just at one end of the building.” “It’s not near the classrooms.” “The current location is not easy for us to get to.” “I would like to see more creative components.” “Incorporate more varied materials.” “Adding things to the wall or materials that could be changed out.”

Due to how effective the administrators perceived their schools' sensory paths to be, all four administrators reported they unequivocally would recommend the purchase and implementation of a sensory path to other administrators. Administrator A said, I would [recommend the purchase], but there would be a lot of things I would do differently.”

“Absolutely, Absolutely! You can use it in any way you want for your kids and that can evolve over time,” Administrator B said as to if she would recommend the sensory path and why.

Administrator C stated, “Yes and we are looking to try to put one outside. I would buy it all over again and even expand ours!” Administrator D replied, “It’s been very beneficial and I would recommend it to every school.”

Many of the teachers also saw the sensory paths as worthwhile reporting that having a ready-to-use intervention that was available at any time was a support to their use of the sensory path. Teacher B1 said, “I think its availability and accessibility, also the fact that it's always there” have been supports to using the sensory path. “You don’t have to plan anything or go out of your way to do anything other than to take the students to it” (Teacher B1). Teacher D1 indicated a similar response when asked about supports to use. “Just the availability. It’s at our leisure or need we don’t have to have specific times for it, and its availability is just a key point right there” (Teacher D1). Teacher D2 stated, “We have the liberty to use it whenever we need it!”

Similar to the administrators, the five teacher participants each stated they would recommend the use of a sensory path to other teachers because of their positive experiences with using the sensory path in their schools. Teacher A simply responded “Yes.” Teacher B1 said:

Yes, definitely. I’ve seen it work with some of my students. If you have a student that [sic] just needs a break throughout the day, it’s a great way for them to go take their break and come back ready to learn.

Teacher B2 also reported she would recommend the use of a sensory path “Yes. I think it’s good if they’re using it in a way to allow students to get wiggles out or change topics, or even just get the kids up and moving.” Teacher D1 simply stated, “Absolutely.” When asked to elaborate on reasons why she said, “For a lot of reasons but mainly because it can work as a reward for any kiddo that just needs a little motivation or it can be used as a movement break so they can get

some movement.” Teacher D2 also replied, “Yes” and explained, “It’s a good brain break for students. It could be used with a whole class, small group, or individual students.”

Implementation Could Be Improved

Administrator A was very blunt in her response to barriers indicating the barrier for School A was a “lack of training and that’s on my part. I haven’t done it.” Administrator A indicated in an answer to an earlier question she took on the purchase and implementation herself and that “I talked about it with the special education teachers but not in any formalized manner” encouraging them to use it. She explained it was “not [shared] with the gen ed [general education] teachers.”

School B has a weekly email that goes out and Administrator B said, “it was included in the notes” of the email. “It included that it was down there [in a hallway], what it could be used for, and what it looked like” but no formal training was given as they felt “teachers can be trusted to use something [sensory path] appropriately.” Teachers at School C were informed similarly. They had no training or direction “they were only told who it was for and that if they chose to use it, to make sure it was outside of regular transition times” (Administrator C). When asked if any training was provided to the teachers at School D, the administrator replied, “No, we didn’t do that. I had sent out a video of it to the staff to let them know that it was there and they could use it with students.”

When asked if there was something they would change about their schools’ implementation process the administrators reported they would enhance implementation by including training and determine a means to collect data. Administrator A explained, “It was not done well [implementation]. We need training. I would make a case for it and then I would train. I would put it in behavior plans so it is specifically used and data can be tracked.” Administrator

B indicated the implementation process at School B needed improvement and said, “I would like to learn from the implementation process of other schools so we can get new ideas for use.”

Administrator D discussed how they were missing the data collection component “I have not seen it in IEPs and I don’t know that it has been directly referenced in behavior plans” and that she would like to see it incorporated in those to ensure the sensory paths use and that the use is monitored.

Increased Use With Additional Locations and Components

Four out of the five teachers interviewed indicated the location of the sensory path in their school was a barrier to use. They felt it was not in a convenient location that would support being used by most teachers. Teacher A said, “It’s not near the classrooms in the upper grades” (Teacher 3). The sensory path in School A is near special education and pre-kindergarten classrooms. Teacher B2 stated, “The current location is not easy for us to get to.” She indicated it was in the kindergarten hallway and that if it were in a more central location “more of our students could access it daily” (Teacher B2). Teacher D1 had a similar response indicating, “It is just at one end of the building in the hallway.” She explained that in School D the location of the sensory path was near some of the special education and kindergarten rooms, but this was inconvenient for others in the building. “I think if there were multiple sensory paths that we would see a lot more participation with it” (Teacher D2). When asked about potential barriers D2 indicated the location was a barrier explaining, “It’s mainly over in the kindergarten area so some of the upper grades don’t have easy access to it. It would be nice if we had another on the other side of the building to increase accessibility” (Teacher D2). In addition to concerns over locations, teachers also mentioned the desire for additional and varied components.

Although all teachers interviewed indicated they would recommend using a sensory path to others, they all also indicated there was room for improvement in their school's sensory path. A common response was that they would like to add more components or varied components to what they already have. Teacher A stated, “incorporating more varied materials and PK [prekindergarten] friendly activities” would help make her school’s sensory path more effective.” According to Teacher B1, “there is no one size fits all sensory path ours was a pre-designed sensory path and I think adding some additional components on the wall can help add more to it.” Teacher B2 said, “I think if it was longer than how it’s set up it would be more beneficial to help students get the movement they need.” Teacher D1 indicated she would like to see “adding different tactile fields would give different textures that they [students] could use.” To improve the path in her school Teacher D2 said, “adding some more things to it including some things that could be put on the wall or if there was a way to change out components occasionally to keep things mixed up and kids engaged.”

Summary

Overall, both administrators and teachers indicated they saw positive changes in student behavior in their schools and classrooms when using the sensory path with students. Based upon what they have seen they all would recommend the use of a sensory path to others. According to administrators, they perceived the implementation process could have been improved and they would like to find a way to collect data on student use. Teachers indicated that the sensory paths were an easy to use and readily available intervention however, they would like to see more components and have them either placed in a more central location or have more than one in their schools.

Conclusions

This study sought to determine the decision-making process of elementary school personnel as they acquired and implemented sensory path interventions in their school and the perceived supports and barriers to the effective use of the sensory path. The themes among the administrators indicated the acquisition and implementation process for each school was an area of weakness. Although acquisition and implementation were areas of concern among the schools, the administrators and teachers indicated the use of their school's sensory path had expanded from its target population. Although they did not have data to support the effectiveness of the sensory path, administrators and teachers reported that using the sensory path as a preventative and calm-down measure with students had a positive impact on student behavior.

The administrator and teacher responses related to supports and barriers to the effective use of the sensory path varied. The overall theme to supports to use was that sensory paths were worthwhile. Administrators reported others seeing the positive effect the path had with students was as support to use. Teachers perceived it as an easy-to-use and always available intervention that the students enjoyed. Administrator responses indicated a lack of training and information when implementing the sensory path was a barrier to use and something to improve upon while teachers noted that the location in their buildings was a barrier to use. Overall, the administrators and teachers indicated they would recommend the use of the sensory path to other schools, administrators, and teachers. The following is a summary of the major findings related to each research question.

Research Question 1

The first research question focused on the decision-making process administrators and teachers followed regarding purchase and implementation of a sensory path. Data analysis

showed that school-level teams did not follow a formal process when making the decision to purchase a sensory path. Many reported first learning about sensory paths from peers or on social media, which piqued interest levels and seemed to be the catalyst that led to the purchase of the sensory paths. The National Center for Educational Statistics (2020) indicated that the number of students identified with disabilities has increased 13% from the 2009-2010 school year to the 2019-2020 school year. Administrators indicated one of the reasons they purchased the sensory paths was due to the increase in student behavior they have seen in recent years. Students with disabilities and students with behavioral needs were the catalysts for the acquisition of the sensory path as a behavioral intervention.

Once school teams purchased sensory paths, the implementation process did not include trainings or protocols for the teachers. There was only a brief mention to the teachers about its availability in two schools, an email describing the sensory path was sent to faculty in one school, and a video was created and shared to show what the sensory path was and how it could be used in the remaining school; the fifth school had not implemented the sensory path due to the pandemic. The informal implementation process and lack of information given to all faculty and staff may have limited the use of the sensory path. This limited awareness means that students who may have benefitted from the sensory path might not have had an opportunity to use it and, therefore, improve their academic and behavioral outcomes.

Research Question 2

The second research question aimed to determine what administrators and teachers perceived as the uses and intended results of using the sensory path to impact student behavior. Both teachers and administrators indicated the target population for the sensory path upon its purchase was students with disabilities, however after implementation the population quickly

expanded to include other students in their buildings. Students in their Tier 1 population, especially in kindergarten through second grade, were now using the sensory path as well.

The sensory path was used by the schools to prevent negative student behavior and as a calm-down measure for escalated students. Administrators and teachers used the sensory path as a proactive measure that allowed students to get excess energy out or to take a break when verbal or non-verbal cues indicated a student was beginning to escalate. Participants also reported that the sensory path was an effective way to redirect and calm students who were in crisis. Teachers indicated it was an easy-to-use intervention that did not require anything of the student, thereby providing a distraction, or outlet, for the students to calm themselves.

Although the participants indicated the intended uses of the sensory path, none reported collecting data—other than anecdotal observations—to determine if the sensory path was, in fact, effective in preventing negative behavior or calming escalated students. Even without this data, both administrators and teachers stated that they had seen positive changes in student behavior among the students who utilized the sensory path.

Research Question 3

The third research question was intended to determine the supports and barriers to the effective use of the sensory path in the schools where implementation occurred. Administrators and teacher responses to the first two research questions were comparable, however, their responses varied greatly on the third question. A theme from the administrators' interviews was that a support to sensory path use was teachers' beliefs about the efficacy of the sensory path when they saw how well it worked with students. In contrast, a theme from teachers' interviews was that a support to sensory path use was its ease of use and easily accessible or available.

Barriers to use included implementing the sensory paths without providing sufficient information and training, per the administrators, and the location of the sensory paths, per the teachers.

Summary

This study provides a foundation for future research related to use of sensory paths with elementary students to potentially improve student outcomes. The findings from this study indicate that the implementation process for the schools is an opportunity for growth. Conducting a process evaluation in conjunction with the implementation would allow for schools to “help explain the outcomes of the intervention and create a model of the pathways of change of the intervention” (Baranowski, 2014, p. 157). School teams are also in need of follow-up to determine an effective means of data collection to measure the effectiveness of the sensory path. Overall, administrator and teacher interview responses indicated that the use of sensory paths had an impact on student behavior in their schools. However, administrator and teacher responses varied regarding the supports of and barriers to effective use of the sensory paths.

Chapter V

Discussion

The purposes of this study are to describe (1) the decision-making processes of elementary school personnel related to acquiring and implementing a sensory path intervention, (2) the perceptions and uses of a sensory path related to student behavior and (3) the supports and barriers of elementary school personnel in implementing a sensory path intervention. The following section presents a discussion of the findings and the connections between the findings and the literature. This chapter concludes with the limitations and delimitations of the study and implications for practice and research.

Discussion

Interpretations from the findings led to three conclusions regarding the acquisition and use of sensory paths in elementary schools. First, the sensory path was adopted without an evidence base to support its purchase. Second, upon acquisition, the sensory path was implemented without program planning and training. Finally, the school teams did not collect data to determine efficacy.

Adopting a Practice Without an Evidence-Base

When asked about reasons their schools chose to adopt a sensory path intervention both administrators and teachers indicated on the survey that one of the reasons was due to the research evidence about efficacy; 40% of administrators selected this as well as 83% of teachers. When conducting the literature review for this paper no research-based studies were found that had examined the use of sensory paths in schools. There was research to support the use of multi-sensory rooms and movement breaks, but none that examined the use of a sensory path. It could be said that sensory paths are a diffusion of innovation evolving from the multi-sensory

environment and movement break research as both methods are combined to some degree when creating and using the sensory path. According to Rogers (2003) innovations may be developed to meet the need of a high-priority problem or need that arises.

During the interview process, administrators and teachers indicated their sensory paths were being used to help support students with behavior needs whether as a behavior prevention measure or as a calm-down method. While this innovation was meeting the needs of the schools it appears to not yet have been vetted by the research process to be considered an evidence-based practice. “Traditionally, educators have used sources such as personal experience, tradition, and expert opinion to discern what works in the classroom” (Cook & Cook, 2011, p. 1). However, this can lead to ineffective practices being implemented, educational research can help to prevent some of the shortcomings of this traditional method (Cook & Cook, 2011).

Survey responses from both the administrators and teachers indicate this method was part of their reasoning for purchasing the sensory path. All of the administrators indicated the benefits they had heard from other schools or teachers played a role in their decision as well as benefits they had read or seen in online articles and videos. Teacher responses indicated 80% heard of the benefits from other schools or teachers and 67% had read about or seen the benefits in online articles or videos.

For interventions or instructional practices to be considered evidence-based, they must be “proven to effective through rigorous research” (Torres et al., 2012). When deciding to implement a new intervention or practice it is important to not only know the research or evidence supporting the practice, but also what training is needed for implementation, what steps to take to implement, what the goals and desired outcomes of implementing are, and how will the success or lack thereof be measured (McCollow & Hoffman, 2020). From what was reported in

the surveys and interviews this appeared to be lacking in each of the four schools where the sensory path was implemented.

Implementation Process

When schools adopt innovations or practices the goal is to use these innovations or practices effectively with the students, which includes staff selection, training, ongoing coaching and consulting, data collection, and administrative support (Fixsen et al., 2009). During the interview process, however, it became evident that there was little planning about how the schools would implement the sensory path with their students. One administrator even reported it as being “haphazard” and not well thought out. According to Rogers (2003), the diffusion of an innovation includes the communication of the innovation through a social system that helps to guide the successful adoption and implementation of the innovation (Bakkabulindi, 2014). The key components of diffusion include the innovation, communication, time, and social systems (Sahin, 2006).

One obstacle to overcome when implementing interventions is uncertainty (Sahin, 2006). Adopting something new can lead those involved to be uncertain of the outcomes; therefore, it is vital to communicate to the stakeholders the possible advantages and disadvantages, as well as any possible desired or undesired outcomes of implementing the innovation (Sahin, 2006). In this study, the administrators reported that the process used to communicate information about the sensory paths included email, brief videos, and conversations with the special education staff. Thus, the communication component of the diffusion theory was an area in need of improvement in each of the schools.

The administrators in the schools with sensory paths could be seen as the change agents or early adopters for the sensory path innovation (Sahin, 2006). Rogers (2003) explains early

adopters are likely to hold leadership roles in their social system and play a role in almost every stage of the innovation process, from initiation to implementation. Early adopters become the role models for the innovations and others turn to them for advice and information (Sahin, 2006). Other members of the social system where the innovation is being adopted will turn to the early adopters as a means to help them develop their attitude toward the innovation (Rogers, 2003). While the administrators felt the sensory paths were effective it is important that they have the data to show this and that they effectively communicate this information throughout their organization to help with the diffusion of the sensory path over time in their school and possibly others.

If the communication related to the innovation is not well planned, this can delay the diffusion process from happening; meaning, the innovation will reach fewer stakeholders (Rogers, 2003; Sahin, 2006). The method of communication and what is communicated by the change agents can impact how quickly the innovation spreads throughout an organization (Sahin, 2006). In this study, the administrators could be seen as the change agents and did not effectively communicate with their social system (i.e., schools) about the sensory path, which means other teachers or students that may have benefitted from the paths use were not using it as they were unaware of the innovation and its purpose.

According to the Center on IDEA Early Childhood Data Systems and Early Childhood TA Center (2019), to effectively implement an intervention or practice one must first clearly define and operationalize what this practice or intervention will look like, how it will be used, and how to determine its effectiveness. While the sensory path was being utilized by select staff there was no training to establish the purpose of the sensory path or how it should or could be utilized with students. Morrison et al. (2019) explained that communication is imperative to the

successful diffusion of an innovation within an organization. Due to the fact that innovations are not typically part of a teacher's preservice training there needs to be a way to disseminate information about the innovation to teachers (Frank et al., 2011). Providing training or in-service learning opportunities to the entire school staff would ensure the sensory path information is communicated to all the staff that may have students who could benefit from its use.

Data to Support Efficacy

When adopting an innovation or practice, the purpose of that innovation should be clearly defined before a decision can be made as to what outcomes to evaluate and how they will be evaluated (Mandinach & Schildkamp, 2020). The teachers had defined a purpose for the path but had no means to collect data to determine if this was successful with the students.

One of the steps to successfully implement evidence-based practices is to monitor the progress of student outcomes (Torres et al., 2012). A plan should be developed and put into place that will track the effects of the implementation over time. Through this process, teachers may find that the intervention is not working as implemented or it may not be effective for all students (Torres et al., 2012). To improve student outcomes, goals should be set and data should be collected and interpreted (Mandinach & Schildkamp, 2020). Schools should, therefore, determine expected outcomes for sensory path use and formally collect data to ensure that sensory paths are being used effectively. This data would then be used to continually monitor and adapt the intervention to "facilitate and optimize the learning process" (Mandinach & Schildkamp, 2020, p. 2). Ongoing data collection allows teachers to determine if the goals they set are being met (Kretlow & Blatz, 2011), which indicates if the sensory path is being effective at positively impacting student outcomes.

Limitations and Delimitations

Limitations of a study are factors outside the control of the researcher, typically linked to the research design, and must be acknowledged by the researcher to present a full picture to the audience (Theofanidis & Fountouki, 2018). Conversely, delimitations are conscious choices made by the researcher regarding the research study and can be used to explain why certain decisions and choices were made by the researcher (Theofanidis & Fountouki, 2018).

The limitations in the current study include the study sites, the instrumentation, and the change to an exploratory study. The study site is a limitation in multiple ways. First, only elementary schools were potential study sites in this district as the sensory path intervention is typically used with younger students. Second, teachers in the district are transient because (a) the district is in proximity to a military base with teachers leaving due to spousal relocation, and (b) teachers often transfer among the 24 elementary schools within the district. Therefore, administrators or teachers that were involved in the acquisition and implementation of a school's sensory path may no longer be at that particular school. Finally, all of the schools participating in the study are located in the same school district. However, this district was chosen because the researcher works in the district and wanted to conduct a study that is relevant to the stakeholders in these schools. Another study site limitation is that one of the five elementary schools the school district indicated had purchased a sensory path had purchased it for the 2020-2021 school year but had not yet installed it for use due to COVID-19. Therefore, that administrator participated in the survey, responding to questions about acquisition, but declined to participate in the interview, which focused on implementation.

Another limitation is that the researcher was only able to collect data using surveys and interviews. Initially, site visits were going to be included as well as used as a means to

triangulate the data collected but, due to COVID-19, many locations were not allowing visitors in their schools during the time data were being collected. This meant that the researcher had to rely on self-reported data in the form of surveys and interviews since site visits (i.e., observations and field notes) of the sensory path could not take place.

The third limitation, the research design, is also related to COVID-19. Initially, a multiple baseline design across participants single-subject research (Horner et al., 2005) was planned to examine the efficacy of sensory path use in increasing the on-task behavior of elementary students. Students would have been observed actually using the path and data would have been collected related to their on-task behavior, pre- and post-intervention. During the COVID-19 pandemic, schools may have been open for traditional learning one day and switched to remote learning the next day. Many of the students who could have participated in the study were at risk of being home under quarantine. This meant the focus of the study needed to change to an exploratory study of acquisition and effective use rather than a single-subject experimental design examining its use as an intervention.

The delimitations in the study include the transferability of the findings, and the problem chosen to study. The location of the study was chosen as a convenience to the researcher as it is where the researcher is employed. This also means that the topic being studied is relevant as sensory paths have been implemented in the schools in the district and the research may be helpful to other schools in the district considering implementing the intervention.

The problem being studied was also a delimitation. The researcher had previous experience conducting field study research in the area of positive behavior intervention support programs. Due to this experience, the researcher wanted to continue research that was related to

the study of behavior and improving behavioral outcomes for all students.

Implications for Practice and Research

The current study examined the decision-making processes of administrators and teachers when acquiring and implementing a sensory path intervention as a means to positively impact student outcomes. Based upon the findings of this study implications for practice include (a) providing training on data-based decision making when looking to acquire interventions, (b) providing training related to best practices for implementing interventions, and (c) developing protocols that include data collection to follow when using school funds to purchase interventions. Implications for future research include (a) addressing the lack of evidence surrounding the use of sensory paths and (b) replicating this study among schools in other school districts to determine if the decision making and implementation process were more effective in other locations.

Implications for Practice

When examining the results of this study, school administrators shared that they did little research into sensory paths to determine if there was evidence to support its use as a sensory intervention. Due to the push for research or evidence-based interventions, administrators should attend districtwide training or professional learning related to data-based decision-making methods to ensure they are making decisions based on research that will be beneficial to their students.

Another implication for practice is to ensure that school personnel and staff receive instruction regarding implementation of a new intervention or practice. Before purchasing and implementing interventions, the school should be developing a plan for how they will determine the efficacy of the intervention. There should be a formal implementation plan or process in

place to determine any training that may be necessary, resources needed, and how school teams will determine the efficacy of the intervention. The findings in this study indicate the implementation process in the schools did not consider how to effectively implement the sensory paths in their schools. They knew the population of students they wanted to target with the intervention but had no plan to measure the efficacy of the sensory paths with the various groups of students.

The findings indicated that administrators and teachers did not have a plan to collect data related to the use of the sensory paths. Perhaps knowing their intended population was students with disabilities, it was assumed the special education teachers would have a means to collect data for the target students. Four out of the five administrators indicated that either school funds or a district grant were used to purchase the sensory paths for their schools. In the future, the district or schools should develop a protocol or process in which those requesting funds will have to indicate a data collection plan to ensure the limited school funds will be used to purchase interventions that can be monitored for effectiveness.

Implications for Research

While conducting the literature review, little to no research could be found on the use of sensory paths as an intervention with students. Information could be found as to what they are and how to purchase but it appears research into their effectiveness has yet to be completed. Future research opportunities include conducting studies regarding the efficacy of sensory paths being used as an intervention to increase on-task behavior in the classroom and/or as an intervention used to redirect or calm down escalated students. Indeed, that was the original intent of this dissertation study before the coronavirus pandemic resulted in schools shifting to virtual instruction. Some schools are already using sensory strategies, including multi-sensory rooms in

both proactive and reactive ways. If efficacy studies of sensory paths provide promising results, schools would have another evidence-based intervention to support their students.

One limitation of this study was that the schools examined were all a part of the same school district. This was done as the researcher works in the school district and wanted to conduct a study relevant to the stakeholders. In the future, this study could be replicated with schools in other districts, particularly those in urban settings, with more culturally and linguistically diverse populations, and with higher incidences of students with behavior-related disabilities. This could help determine if there are more effective means to adopting and implementing interventions being used outside of the current school district being studied.

Moving forward additional research is needed into the use of sensory paths in schools. All of the administrators and teachers reported seeing the positive impact the sensory path was having with their students. They felt it was so beneficial they also all indicated they would recommend its use to others. According to the interconnected model of professional growth, in some instances, it is only after teachers have experienced the success brought on by an intervention that they will buy into its use (Clarke & Hollingsworth, 2002). These teachers' experiences could be beneficial to future research or professional learning related to sensory paths as these teachers have grown professionally through experimenting with the use of the sensory paths and could reflect on their practice with others (Clarke & Hollingsworth, 2002). Future research is needed to show that sensory paths can be utilized as an evidence-based practice that positively impacts student outcomes.

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Appendix A

Research Matrix

Research Question	Constructs	Measures and Instrumentation	Data Collection	Data Analysis
RQ 1: What were the decision-making processes of administrators and teachers regarding the acquisition of a sensory path intervention?	Decision making processes The 5-stage Innovation Decision Process (Rogers, 2003)	Survey -Closed items -Open items	Once	Descriptive statistics, in vivo and descriptive coding (Saldana, 2016)
		Interviews	Post-survey analysis	In vivo and descriptive coding (Saldana, 2016)
RQ 2: What do administrators and teachers perceive as the uses and efficacy of a sensory path intervention?	Uses of sensory path, efficacy of sensory path, implementation fidelity Adherence, quality of delivery, program differentiation, program characteristics (Dusenbury et al., 2003).	Survey -Closed items -Open items	Once	Descriptive statistics, in vivo and descriptive coding (Saldana, 2016)
		Interviews	Post-survey analysis	In vivo and descriptive coding (Saldana, 2016)
RQ3: What do administrators and teachers perceive as supports and barriers to the effective use of a sensory path intervention?	Supports, Barriers - Adherence, participant responsiveness, quality of delivery, dose (Dusenbury, 2003) - Re-invention, dissonance (Rogers, 2003)	Survey -Closed items -Open items	Once	Descriptive statistics, in vivo and descriptive coding (Saldana, 2016)
		Interviews	Post-survey analysis	In vivo and descriptive coding (Saldana, 2016)

Appendix B

Administrator Survey

Administrator Survey with Informed Consent Statement

Project Title: Examining the Acquisition, Implementation, and Uses of Sensory Paths to Support Students' On-Task Behavior
Investigator: Rachel Funderburk
APSU Faculty Advisor: Dr. Sherri Prosser
Department: Education Specialties

INTRODUCTION

The Department of Education Specialties at Austin Peay State University supports the practice of protection for human subjects participating in research. The following information is provided to help you decide whether you wish to participate in the present study. You retain the right to refuse to sign this form and not participate in this study. You should be aware that even if you consent to participate in this study, you may withdraw from this study at any time without consequence. If you choose to withdraw from this study, it will not affect your relationship with this department, the services it may provide to you, or Austin Peay State University.

PURPOSE

The purposes of this study are two-fold: (1) to illustrate the decision-making processes of elementary school personnel related to acquiring and implementing a sensory path intervention and (2) to describe the experiences of elementary school personnel that have implemented a sensory path intervention and their perceptions of its effective use as a means to positively impact student outcomes.

PROCEDURES

You will be asked to participate in a survey and, potentially, a follow-up interview related to your experience with your school's sensory path. After signing this consent form, you will be provided with a link to the online survey, which includes a question on whether you would be willing to participate in a follow-up interview. The link will be open for one week. A reminder will be sent after day 5 and day 10 to those who have yet to submit the survey. The survey is expected to take approximately 5-7 minutes to complete and the follow-up interview would last no more than 20-30 minutes.

RISKS

The risks associated with participation in this study are no greater than those encountered in daily life.

BENEFITS

A benefit of this study would be to determine the perceived efficacy of sensory paths as related to student outcomes as well as identify possible barriers and supports to the effective use of the sensory path. These findings could be used to guide future acquisition and implementation of sensory paths in local elementary schools.

COMPENSATION

Participants will not receive compensation.

PARTICIPANT CONFIDENTIALITY

Any study records that identify you will be kept confidential to the extent possible by law. The records from your participation may be reviewed by people responsible for making sure that research is done properly, including members of the Austin Peay State University Institutional Review Board. Otherwise, records that identify you will be available only to people working on the study, unless you give permission for other people to see the records.

REFUSAL TO SIGN CONSENT

You are not required to sign this Consent form and you may refuse to do so without affecting your right to participate in any programs or events of Austin Peay State University or any services you are receiving or may receive from Austin Peay State University. However, if you refuse to sign, you cannot participate in this study.

CANCELLING CONSENT

You may withdraw your consent to participate in this study at any time. If you choose to withdraw from the study before data collection is completed, any collected data will be destroyed and not used.

QUESTIONS ABOUT PARTICIPATION

If you have any questions about the procedures, you may direct them to the principal investigator, Rachel Funderburk.

CONSENT

I have read the above information and received a copy of this form. I have had the opportunity to ask questions regarding my participation in this study. I agree to take part in this study as a research participant. By my signature I affirm that I am at least 18 years old and a student at Austin Peay State University.

1. I agree to take part in this study as a research participant

Mark only one oval.

- ☐ Yes, I agree and hereby give my informed consent. *Skip to question 2*
- ☐ No, I do not give consent.

Skip to question 2

Administrator Survey

Participant Demographics and Survey Questions

2. How many years of experience do you have in education (ex. teaching, coaching, assistant principal, principal)?

Mark only one oval.

- ☐ 0-5 years
☐ 6-10 years
☐ 11-15 years
☐ 16-20 years
☐ 20+ years

3. How many years have you been an assistant principal or principal?

Mark only one oval.

- ☐ 0-3 years
☐ 4-6 years
☐ 7-9 years
☐ 10-12 years
☐ 13-15 years
☐ 15+ years

4. Please indicate how many years you have taught special education if at all?

Mark only one oval.

- ☐ 0-3 years
☐ 4-6 years
☐ 7-9 years
☐ 10-12 years
☐ 13-15 years
☐ 15+ years

5. How many years have you been at your current school?

Mark only one oval.

- ☐ 0-3 years
☐ 4-6 years
☐ 7-9 years
☐ 10-12 years
☐ 13-15 years
☐ 15+ years

6. List all degrees you hold that are related to education (ex. bachelor's in special education, master's in educational leadership).

7. In which academic year did your school purchase its sensory path?

Mark only one oval.

- ☐ 2021-2022
☐ 2020-2021
☐ 2019-2020
☐ 2018-2019
☐ 2017-2018
☐ 2016-2017
☐ Prior to 2016-2017

8. Describe how the idea of a sensory path came about.

9. What was the funding source for the sensory path purchase (ex. school funds, PTO, fundraiser)?

10. Why did your school purchase a sensory path (check all that apply, in order of importance)?

Mark only one oval per row.

	Benefits described by other schools or teachers	The appeal of the multi-sensory approach	Benefits described in online articles or videos	Research evidence about efficacy	Benefits described at a training or conference	Advertising for the product	Other
First choice	☐	☐	☐	☐	☐	☐	☐
Second choice	☐	☐	☐	☐	☐	☐	☐
Third choice	☐	☐	☐	☐	☐	☐	☐
Fourth choice	☐	☐	☐	☐	☐	☐	☐
Fifth choice	☐	☐	☐	☐	☐	☐	☐
Sixth choice	☐	☐	☐	☐	☐	☐	☐

11. If you chose "Other", please explain

12. Please provide the names of up to 6 teachers who were (a) involved in the implementation of the sensory path and/or (b) currently use the sensory path with students on a regular basis.

13. Would you be willing to participate in a 20-30 minute interview related to your school's sensory path?

Mark only one oval.

- ☐ Yes
- ☐ No
- ☐ Maybe, but I would like more information

14. If you indicated you would be willing to participate in the interview please provide your email address for follow-up communication.

Appendix C

Teacher Survey

Teacher Survey with Informed Consent Statement

Project Title: Examining the Acquisition, Implementation, and Uses of Sensory Paths to Support Students' On-Task Behavior

Investigator: Rachel Funderburk

APSU Faculty Advisor: Dr. Sherri Prosser

Department: Education Specialties

The respondent's email (**null**) was recorded on submission of this form.

1. Email *

INTRODUCTION

The Department of Education Specialties at Austin Peay State University supports the practice of protection for human subjects participating in research. The following information is provided to help you decide whether you wish to participate in the present study. You retain the right to refuse to sign this form and not participate in this study. You should be aware that even if you consent to participate in this study, you may withdraw from this study at any time without consequence. If you choose to withdraw from this study, it will not affect your relationship with this department, the services it may provide to you, or Austin Peay State University.

PURPOSE

The purposes of this study are two-fold: (1) to illustrate the decision-making processes of elementary school personnel related to acquiring and implementing a sensory path intervention and (2) to describe the experiences of elementary school personnel that have implemented a sensory path intervention and their perceptions of its effective use as a means to positively impact student outcomes.

PROCEDURES

You will be asked to participate in a survey and, potentially, a follow-up interview related to your experience with your school's sensory path. After signing this consent form, you will be provided with a link to the online survey, which includes a question on whether you would be willing to participate in a follow-up interview. The link will be open for one week. A reminder will be sent after day 5 and day 10 to those who have yet to submit the survey. The survey is expected to take approximately 5-7 minutes to complete and the follow-up interview would last no more than 20-30 minutes.

RISKS

The risks associated with participation in this study are no greater than those encountered in daily life.

BENEFITS

A benefit of this study would be to determine the perceived efficacy of sensory paths as related to student outcomes as well as identify possible barriers and supports to the effective use of the sensory path. These findings could be used to guide future acquisition and implementation of sensory paths in local elementary schools.

COMPENSATION

Participants will not receive compensation.

PARTICIPANT CONFIDENTIALITY

Any study records that identify you will be kept confidential to the extent possible by law. The records from your participation may be reviewed by people responsible for making sure that research is done properly, including members of the Austin Peay State University Institutional Review Board. Otherwise, records that identify you will be available only to people working on the study, unless you give permission for other people to see the records.

REFUSAL TO SIGN CONSENT

You are not required to sign this Consent form and you may refuse to do so without affecting your right to participate in any programs or events of Austin Peay State University or any services you are receiving or may receive from Austin Peay State University. However, if you refuse to sign, you cannot participate in this study.

CANCELLING CONSENT

You may withdraw your consent to participate in this study at any time. If you choose to withdraw from the study before data collection is completed, any collected data will be destroyed and not used.

QUESTIONS ABOUT PARTICIPATION

If you have any questions about the procedures, you may direct them to the principal investigator, Rachel Funderburk.

CONSENT

I have read the above information and received a copy of this form. I have had the opportunity to ask questions regarding my participation in this study. I agree to take part in this study as a research participant. By my signature I affirm that I am at least 18 years old and a student at Austin Peay State University.

2. I agree to take part in this study as a research participant.

Mark only one oval.

- ☐ Yes, I agree and hereby give my informed consent. *Skip to question 3*
- ☐ No, I do not give consent.

3. How many years of experience do you have in education?

Mark only one oval.

- ☐ 0-5 years
☐ 6-10 years
☐ 11-15 years
☐ 16-20 years
☐ 20+ years

4. Please indicate how many years you have taught special education if at all?

Mark only one oval.

- ☐ 0-5 years
☐ 6-10 years
☐ 11-15 years
☐ 16-20 years
☐ 20+ years

5. How many years have you been at your current school?

Mark only one oval.

- ☐ 0-5 years
☐ 6-10 years
☐ 11-15 years
☐ 16-20 years
☐ 20+ years

6. List all degrees you hold that are related to education (ex. bachelor's in special education, master's in elementary education).

7. What is your current role and what grade levels do you teach (ex. 1st-grade general education teacher or K-1 special education resource teacher)?

8. Why did your school purchase a sensory path (check all that apply, in order of importance)?

Mark only one oval per row.

[illegible]

9. How many students are in your class, on your caseload, or on your roster?

10. Approximately how many of your students use the sensory path multiple times a day (if you are virtual, how many used it when traditional)?

11. Approximately how many of your students use the sensory path once a day?

12. Approximately how many of your students use the sensory path multiple times a week?

13. Approximately how many of your students use the sensory path once a week?

14. Would you be willing to participate in a 20-30 minute interview related to your experience with the sensory path?

Mark only one oval.

☐ Yes

☐ No

☐ Maybe, I would like more information

15. If you indicated you would be willing to participate in the interview please provide your email address for follow-up communication.

Appendix D

Administrator Interview Protocol

Thank you for agreeing to be interviewed as a part of this study. The purpose of this interview will be to gain an understanding of the reason your school purchased and implemented a sensory path intervention. It will be used to examine the decision-making process administrators follow when purchasing and implementing interventions in their schools.

I want to ensure I capture what you say accurately so I would like to record our interview with your permission. Do I have your permission to record this interview session?

I would like to begin by getting an idea into your decision-making process as it relates to the implementation of the sensory path.

*The first set of questions I am going to ask will be related to the **decision-making process related to the acquisition** of the sensory path.*

1. When did you first learn about sensory paths? (RQ1)
2. What was your role in acquiring the sensory path? (RQ1)
 - a. Explain how the sensory path came to be at your school? (if not already explained)
3. For which students was the sensory path purchased? (RQ1, RQ2))

*The next several questions are about the **uses and usefulness** of the sensory path.*

4. Has its use expanded beyond that population of students? (RQ2)
5. Were teachers given type of training or protocols regarding the use of the path? (RQ2, RQ3)
 - a. What types of training?
 - b. Where are the protocols kept? How can they be accessed?
6. Is the sensory path used for a specific purpose?
 - a. Prompt as needed: is it for specific students, or a specific set of students, part of a calm down room, or for whoever wants to use it? (RQ2)
7. Who is responsible for teaching the students how to use the sensory path? (RQ2, RQ3)
 - a. Is there a set of expectations or directions for use that are communicated with the users?

8. How do teachers seem to feel about the sensory path, now that it has been in your school for ____ years? (RQ2, RQ3)
9. What would you say were the benefits of implementing the path? (RQ2)

*The final set of questions are about the supports and barriers to the **effective use** of the sensory path.*

10. How do your teachers know if the sensory path is being used effectively? (RQ3).
11. What has supported teachers' effective use of the sensory path? (RQ3)
12. What could be seen as barriers to teachers' effective use of the sensory path? (RQ3)
13. Would you attribute any changes in student behavior to the sensory path? (RQ3)
 - a. If Yes.... Would you recommend the purchase of a sensory path to other school leaders? (RQ3)
 - b. Are you able provide a specific example of a student who has benefited from the sensory path? (RQ3)
 - c. If no.... What do you think could change to make the sensory path more effective? (RQ3)
14. Is there any other information about your school's sensory path you would like to share?

Thank you for taking the time to participate in the interview and share information with me about your school and the process by which it purchased and implanted your sensory path.

Appendix E

Teacher Interview Protocol

Thank you for agreeing to be interviewed as a part of this study. The purpose of this interview will be to gain an understanding of the reason your school purchased and implemented a sensory path intervention. It will be used to examine the decision-making process administrators and teachers follow when purchasing and implementing the intervention in their school.

I want to ensure I capture what you say accurately so I would like to record our interview with your permission. Do I have your permission to record this interview session?

I would like to begin by getting an idea into your decision-making process as it relates to the implementation of the sensory path.

*The first set of questions I am going to ask will be related to the **decision-making process related to the acquisition** of the sensory path.*

1. When did you first learn about sensory paths? (RQ1)
 - a. What was something about the sensory path that caught your attention?
2. Did you play a role in the acquisition of the sensory path? (RQ1)
 - a. If so, can you explain your role?
 - b. If not, was the purpose of the acquisition explained to the staff?

*The next several questions are about the **uses and usefulness** of the sensory path.*

3. Were teachers given type of training or protocols regarding the use of the path? (RQ2, RQ3)
 - a. What types of training? Did you find the training useful?
 - b. Where are the protocols kept? How can they be accessed?
4. Is the sensory path used for a specific purpose?
 - a. Prompt as needed: is it for specific students, or a specific set of students, part of a calm down room, or for whoever wants to use it? (RQ2)
5. Who is responsible for teaching the students how to use the sensory path? (RQ2, RQ3)
 - a. Is there a set of expectations or directions for use that are communicated with the users?

6. How do teachers seem to feel about the sensory path, now that it has been in your school for ____ years? (RQ2, RQ3)

*The final set of questions are about the supports and barriers to the **effective use** of the sensory path.*

7. How do you know if the sensory path is being used effectively? (RQ3).
8. What has supported teachers' effective use of the sensory path? (RQ3)
9. What could be seen as barriers to teachers' effective use of the sensory path? (RQ3)
10. Would you attribute any changes in student behavior to the sensory path? (RQ3)
- a. If Yes.... Would you recommend the use of a sensory path to other teachers? (RQ3)
 - b. Are you able provide a specific example of a student who has benefited from the sensory path? (RQ3)
 - c. If no.... What do you think could change to make the sensory path more effective? (RQ3)
11. Is there any other information about your school's sensory path you would like to share?

Thank you for taking the time to participate in the interview and share information with me about your school and the process by which it purchased and implanted your sensory path.

Appendix F

Informed Consent

INFORMED CONSENT STATEMENT

Examining the Acquisition and Implementation of Sensory Pathways to Support Students' On-Task Behavior

INTRODUCTION

The Department of Education Specialties at Austin Peay State University supports the practice of protection for human subjects participating in research. The following information is provided to help you decide whether you wish to participate in the present study. You retain the right to refuse to sign this form and not participate in this study. You should be aware that even if you consent to participate in this study, you may withdraw from this study at any time without consequence. If you choose to withdraw from this study, it will not affect your relationship with this department, the services it may provide to you, or Austin Peay State University.

PURPOSE

The purpose of this study is two-fold: (1) to illustrate the decision-making processes of elementary school personnel related to acquiring and implementing a sensory path intervention and (2) to describe the experiences of elementary school personnel that have implemented a sensory path intervention and their perceptions of its effective use as a means to positively impact student outcomes.

PROCEDURES

You will be asked to participate in a survey and, potentially, a follow-up interview related to your experience with your school's sensory path. After signing this consent form, you will be provided with a link to the online survey, which includes a question on whether you would be willing to participate in a follow-up interview. The link will be open for one week. A reminder will be sent after day 4 to those who have yet to submit the survey. The survey is expected to take less than 10 minutes to complete and the follow-up interview would last approximately 30 minutes.

RISKS

The risks associated with participation in this study are no greater than those encountered in daily life.

BENEFITS

A benefit of this study would be to determine the perceived efficacy of sensory paths as related to student outcomes as well as identify possible barriers and supports to the effective use of the sensory path. These findings could be used to guide future acquisition and implementation of sensory paths in local elementary schools.

COMPENSATION

Participants will not receive compensation.

PARTICIPANT CONFIDENTIALITY

Any study records that identify you will be kept confidential to the extent possible by law. The records from your participation may be reviewed by people responsible for making sure that research is done properly, including members of the Austin Peay State University Institutional Review Board. Otherwise, records that identify you will be available only to people working on the study, unless you give permission for other people to see the records.

REFUSAL TO SIGN CONSENT

You are not required to sign this Consent form and you may refuse to do so without affecting your right to participate in any programs or events of Austin Peay State University or any services you are receiving or may receive from Austin Peay State University. However, if you refuse to sign, you cannot participate in this study.

CANCELLING THIS CONSENT

You may withdraw your consent to participate in this study at any time. If you choose to withdraw from the study before data collection is completed, any collected data will be destroyed and not used.

QUESTIONS ABOUT PARTICIPATION

If you have any questions about the procedures, you may direct them to the principal investigator, Rachel Funderburk.

CONSENT

I have read the above information and received a copy of this form. I have had the opportunity to ask questions regarding my participation in this study. I agree to take part in this study as a research participant. By my signature I affirm that I am at least 18 years old and a student at Austin Peay State University.

Print Participant's Name Date

Participant's Signature Date

RESEARCHER CONTACT INFORMATION

Primary Investigator: Rachel Funderburk
Email: RFunderburk@my.apsu.edu
Phone: 931-624-6238

Faculty Advisor: Sherri Prosser
Email: ProsserS@apsu.edu
Phone: 931-221-7516

IRB Contact Information
Dr. Joniann Butterfield, Chair
Beth Hoilman, IRB Assistant
irb@apsu.edu
(931) 221-7881

Appendix G

Austin Peay State University IRB Approval



Date: 02/25/2021

Re 21-012:

TITLE OF PROJECT: Examining the Acquisition, Implementation, and Uses of Sensory Paths to Support Students' On-Task Behavior

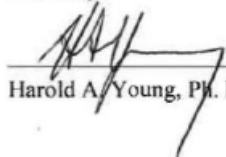
Dear Dr. Prosser and Ms. Funderburk,

We appreciate your cooperation with the human research review process. This letter is to inform you that study 21-012 has been reviewed on an expedited level. It is my pleasure to tell you that your revised application is approved.

This approval is subject to APSU Policies and Procedures governing human subject research. The IRB reserves the right to withdraw approval if unresolved issues are raised during the review period. Any changes or deviations from the approved protocol must be submitted in writing to the IRB for further review and approval before continuing.

This approval is for one calendar year and a closed study report or request for continuing review is required on or before the expiration date, 2/24/2022. If you have any questions or require further information, you can contact me by phone (931-221-7059) or email (young@apsu.edu).

Sincerely,



Harold A. Young, Ph. D. Chair, APIRB

Appendix H

Survey Recruitment Email Script

Dear prospective study participant,

My name is Rachel Funderburk, and I am a doctoral candidate at Austin Peay State University. I am writing this email to invite you to participate in a research study regarding the Sensory Path in your school. The purpose of this study is to examine the decision-making process of elementary school personnel related to acquiring and implementing a sensory path intervention as well as describing the supports and barriers of elementary school personnel in implementing a sensory path intervention and their perceptions of its use related to student behavior.

The study has been reviewed and received ethics clearance through Austin Peay State University Institutional Review Board and the Clarksville-Montgomery County Director of Accountability.

This study will be conducted during spring, and potentially summer, of 2021. During that time, I will collect and analyze data related to the acquisition, implementation, and use of a sensory path in your school. If you agree to participate, you will be asked to complete a 12- to 13-item survey using Google Forms, which is expected to take 5-7 minutes to complete. Your survey responses will be anonymous unless you indicate you would be willing to participate in a follow-up interview, in which case you would be asked to provide a contact email address.

Your participation in this study is entirely voluntary: You choose whether to participate. If you choose to participate in the study, you can stop your participation at any time. Participation or non-participation will have no bearing on your teacher evaluations or future employment.

By participating in this study, you will provide insights into the perceived efficacy of sensory paths related to student behavior as well as identify possible barriers and supports to the effective use of the sensory path. These findings could be used to guide future acquisition and implementation of sensory paths in local elementary schools.

If you are interested in participating, please respond to this email. I will then send a confirmation email and schedule a virtual meeting with you to review the consent document. You will return the completed consent form to me via email.

Thank you very much for your consideration.
Sincerely,

Rachel Funderburk
Elementary Special Populations Consulting Teacher
Clarksville-Montgomery County School System
Office: 931-553-2059
Email: Rachel.Funderburk@cmcss.net



Appendix I

Interview Recruitment Email Script

Dear prospective study participant,

My name is Rachel Funderburk, and I am a doctoral candidate at Austin Peay State University. I am writing this email to invite you to participate in a research study regarding the Sensory Path in your school. The purpose of this study is to examine the decision-making process of elementary school personnel related to acquiring and implementing a sensory path intervention as well as describing the supports and barriers of elementary school personnel in implementing a sensory path intervention and their perceptions of its use related to student behavior.

The study has been reviewed and received ethics clearance through Austin Peay State University Institutional Review Board and the Clarksville-Montgomery County Director of Accountability.

This study will be conducted during spring, and potentially summer, of 2021. During that time, I will collect and analyze data related to the acquisition, implementation, and use of a sensory path in your school. As part of your survey response, you indicated you would be willing to participate in a follow-up one-on-one interview. This interview will be conducted via Zoom, will be audio recorded, and is expected to take 20-30 minutes to complete.

All data will be de-identified prior to being analyzed. If you choose to participate in the interview, your name and contact information will not be included in the verbatim transcription of the audio recording. Instead, you will be assigned a participant number, which will match the participant number of your survey. The specifics for confidentiality and data storage are detailed in the informed consent form.

Your participation in this study is entirely voluntary. You choose whether to participate. If you choose to participate in the study, you can stop your participation at any time. Participation or non-participation will have no bearing on your teacher evaluations or future employment.

By participating in this study, you will provide insights into the perceived efficacy of sensory paths related to student behavior as well as identify possible barriers and supports to the effective use of the sensory path. These findings could be used to guide future acquisition and implementation of sensory paths in local elementary schools.

If you are interested in participating, please respond to this email. I will then send a confirmation email and schedule a virtual meeting with you to review the consent document. You will return the completed consent form to me via email.

Thank you very much for your consideration.
Sincerely,

Rachel Funderburk
Elementary Special Populations Consulting Teacher
Clarksville-Montgomery County School System
Office: 931-553-2059
Email: Rachel.Funderburk@cmcss.net



Appendix J

Clarksville-Montgomery County Permission to Conduct Research Approval Letter



Clarksville-Montgomery
County School System

Dr. Kimi Sucharski
Accountability
Phone: 931.553.1142
Fax: 931.920.9813
Kimi.sucharski@cmcsc.net

From: Dr. Kimi Sucharski
CMCSS Research Team

3.22.2021

To: Rachel Funderburk

Subject: Request to Conduct Research in CMCSS

The Clarksville Montgomery County School System Research Committee has met and approved your request to conduct research in the district at Glenellen Elementary, Carmel Elementary, Moore Magnet Elementary, North East Elementary, and Pisgah Elementary investigating Sensory Pathway. This includes the collection of data as outlined in your request.

A handwritten signature in black ink that reads 'Dr. Kimi Sucharski'.

Dr. Kimi Sucharski
Director of Accountability
Kimi.Sucharski@cmcsc.net