Investigating the Effects of a Sentence Writing Strategy and a Self-Monitoring Procedure on the Writing Performance of Students with Autism Spectrum Disorder

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INVESTIGATING THE EFFECTS OF A SENTENCE-WRITING STRATEGY
AND A SELF-MONITORING PROCEDURE ON THE
WRITING PERFORMANCE OF STUDENTS WITH
AUTISM SPECTRUM DISORDER

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Doctor of Philosophy -- Special Education

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August 2013
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entitled

Investigating the Effects of a Sentence-Writing Strategy and a Self-Monitoring Procedure on the Writing Performance of Students with Autism Spectrum Disorder

is approved in partial fulfillment of the requirements for the degree of

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August 2013
ABSTRACT

Investigating the Effects of a Sentence-Writing Strategy and a Self-Monitoring Procedure on the Writing Performance of Students With Autism Spectrum Disorder

By

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Writing is a tool students with autism spectrum disorder (ASD) can use to communicate and interact with other people socially and professionally. Strong writing skills may lead to social and economic success, as well as a sense of self-empowerment. Unfortunately, there is very little research related to the use of sentence-writing strategies and self-monitoring procedures to improve the writing performance of adolescent students with ASD. Thus, this study was designed to examine the effects of a sentence-writing strategy and a self-monitoring procedure on the writing performance of adolescents with ASD.

The study included five participants. These participants attended the same junior high school in a large southwestern city and were in the sixth, seventh, or eighth grade. Each participant had a spectrum disorder.

A multiple baseline across participants design with one replication was used in this research. There were three conditions in this design: baseline, Intervention 1: sentence writing strategy, Intervention 2: self-monitoring procedure, and Maintenance. A comparison of curriculum-based probes between phases was conducted in order to assess the functional relationship between the independent and dependent variables. The
independent variables were The Proficiency in Sentence Writing Strategy (Schumaker & Sheldon, 1999) and the self-monitoring procedure. The dependent variables were writing quality and writing quantity. Writing quality was measured using specific predictive indicators for writing quality and criterion described in the Proficiency in Sentence Writing Strategy Instructor's Manual (Schumaker & Sheldon, 2006). Writing quantity was measured by counting the total number of words written during each session. A visual analysis of the data revealed five things. First, each participant responded differently to the sentence writing strategy and the self-monitoring procedure. Second, when the interventions were combined, a moderate effect size resulted. Third, participants' feelings about writing may have influenced performance levels. Fourth, all the participants ended the study feeling better about their own writing ability, and fifth, the sentence writing strategy and the self-monitoring procedure are socially valid interventions that may improve the overall writing performance levels of middle school students with ASD. These findings support the use of The Proficiency in Sentence Writing strategy and the self-monitoring procedure in middle schools and classrooms where middle school age students with ASD are receiving writing instruction.
ACKNOWLEDGEMENTS

There will always people who pass in and out of our lives. Some of these people we easily forget and some we remember because of the impact they make on our lives. I want to acknowledge some of the people who have made an impact on my life in ways I will not forget. My committee included Dr. Susan Miller, Dr. Tom Pierce, Dr. Cynthia Carruthers, and Dr. Richard Tandy. It was an honor to have these four knowledgeable and accomplished professionals on my team. Their comments and suggestions helped inform my thinking.

I would also like to thank my advisor, Dr. Susan Miller, for sharing her knowledge and professional expertise with me. It was because of her professionalism, knowledge, positive nature, and tact that my time in the doctoral program went as smoothly as it did. I feel privileged to have had her as a teacher, mentor, coach and advisor. I will always be grateful for her guidance and support.

In addition, I would like to acknowledge the support of a couple of good people, my parents Don and Terri. It was because of their expressed pride and confidence in me that I was able to believe I would eventually reach the proverbial light at the end of the tunnel.

Finally, I can only consider myself a success in life because I have the respect and support of my wife, Anna Marie. She has been generous with both her respect and support over the years in ways that cannot be measured. It is always because of her wisdom and concern for me that I am able to deeply understand and appreciate my own accomplishments. She has helped me see the person I am. I am grateful to have her love and companionship.
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Chapter 1

Introduction

The acquisition of literacy skills establishes a foundation for social equity (Intersegmental Committee of the Academic Senates, 2002). A literate person is someone who freely and strategically builds meaning from text, develops a conceptual understanding from what is read, and communicates this understanding in verbal and written form (Mazzoni & Gambrell, 2003). People who have these skills have the potential to build financial and social success (Graham & Hebert, 2010).

Writing is a specific skill with many purposes. Deatline-Buchman and Jitendra (2006) defined writing as a basic communicative skill. Writing connects people, provides a means for gathering, preserving, and transmitting information, and is a way for people to shape and extend their knowledge of specific topics (Graham & Harris, 2005; Graham & Hebert, 2010). Also, the act of writing has the potential to benefit the writer personally, socially, and academically (Englert, 1992; Leavitt & Pill, 1995; Slatcher & Pennebaker, 2006; Sloan, Marx, Epstein, & Dobbs, 2008).

The act of writing can bring relief to people feeling emotional and physical pain (Slatcher & Pennebaker, 2006; Sloan et al., 2008; Smyth, 1998). The writing process and final written product become a conduit for people to channel their emotions at times when talking about their feelings is a challenge (Smyth, 1998). Expressive writing, in particular, may help reshape the maladaptive cognitions of people in depressed states and help them confront, process, organize, and manage their negative thoughts and feelings (Sloan et al., 2008). It may also help people with depression see a way out of hopeless situations (Sloan et al., 2008), and just as significantly, physical situations wrought with
pain. Sloan et al. (2008) identified research in which the expressive writing procedure was shown to ease the physical health of people with cancer, asthma, arthritis, fibromyalgia, and chronic pain. In addition to the psychological and physical benefits of the writing process, positive social effects may also occur.

Written communications between people support their social and personal relationships. Specific kinds of words used in written communications influence the development and maintenance of social and personal relationships (Slatcher & Pennebaker, 2006). Written communications between couples may help repair damaged relationships, as well as stabilize healthy relationships (Slatcher & Pennebaker, 2006).

From an educational perspective, writing has many benefits. Writing advances personal expression, self-reflection, critical and flexible thinking, reading comprehension, and reading fluency (Drabick, Weisberg, Paul, & Bubier, 2007; Graham & Hebert, 2010; Leavitt & Pill, 1995). Additionally, writing skill is a predictor of future academic success and future employability (Graham & Perin, 2007; Pennington, 2009). Finally, the ability to communicate effectively using a written format is necessary for success in the current age of globalism and instant communication (Friedman, 2005). Clearly, there are many benefits associated with becoming a proficient writer. The emergence of these benefits has resulted in an increased emphasis on the importance of written expression within school curricula, and subsequently, several approaches for teaching this skill have been developed.
Current Approaches Related to Writing Instruction

The Process Approach

The process approach to writing instruction can be described as humanistic, flexible, and democratic (Beane, Lipka, and Ludewig, 1980; Pollington, Wilcox, & Morrison, 2001). Writers’ Workshop is the most popular example of the process approach to writing. Calkins and Graves developed this approach in the late 1980s. Teachers of writing who use this approach, construct a writing environment in their classrooms, invite students to develop individual and personal writing projects, and facilitate students’ growth in the writing process (Calkins, 1994). Writing topics are self-selected by the students. Students identify their reading audience. They are taught how to revise using revision strategies and how to confer with peers to critique each others’ writing (Jasmine & Weiner, 2007; McCarthey, 2008). Grammar and mechanics are taught through mini-lessons. The role of the teacher is to organize and give structure to the workshops, model writing activities, and support student writers in the writing process (McCarthey, 2008).

The Writers’ Workshop format begins with teacher sharing time. It lasts approximately 5-10 minutes (Pollington, Wilcox, & Morrison, 2001). Teachers share with their students various poems, stories, songs, and even some of their own writing. Teacher sharing time is followed by a 5-10 minute mini-lesson (Pollington et al., 2001). The mini-lesson is a teacher directed writing lesson (Pollington et al., 2001). Calkins (1994) used the mini-lesson as a daily agenda item and as a means to introduce a new writing method. It is the teachers’ time to raise concerns, dive into specific writing issues students have, model writing strategies, and reinforce strategies (Calkins, 1994).
Students' specific and individual writing needs influence what is taught during the mini-lesson (Calkings, 1994; Pollington et al., 2001). The mini-lesson is followed by "state of the class." This component of the Writers' Workshop lasts approximately five minutes. In these five minutes, the teacher completes a quick formative assessment and determines where each student is in the writing process (Pollington et al., 2001). A 30-40 minute independent student work time follows "state of the class." Students work alone, in small groups, or with the teacher. The workshop concludes with 5-10 minutes of sharing time, wherein students share their own writing with their peers (Pollington et al., 2001).

The Focus on Genre Approach

The focus on genre approach to writing is less structured and more holistic than cognitive approaches to writing. Students make a stylistic choice about how best to express themselves in writing (McCarthey, 2008). Based on their knowledge of genres in writing, students may decide to write a persuasive essay, a fictional narrative, or an expository essay. This approach does not include specific definitions or concrete features (McCarthey, 2008). When using this approach, teachers expose students to many different types of genres, such as narrative and expository (McCarthey, 2008). The characteristics of each genre separate one from the other. The characteristics of a fictional narrative are that it is entertaining, includes specific events, is loosely structured, and includes dialogue. Whereas an expository composition gives information supported by facts, is tightly structured, and has few quotations (Gould & Gould, 1999). Students’ understanding of genres develops in a non-linear manner. It is important for students to be exposed to multiple genres simultaneously (McCarthey, 2008). The 6 + 1 Traits of Writing is a writing and assessment tool that helps students learn about ideas,
organization, voice, and conventions within the structure of specific genres (Culham, 2003; McCarthey, 2008). It also provides for teachers of writing a broad and common vocabulary to use when communicating what quality writing looks and sounds like (Culham, 2003).

The Cognitive Process Approach

The cognitive process approach involves teaching students meta-cognitive strategies, such as self-regulating strategies and explicit cognitive strategies (McCarthey, 2008). These kinds of strategies benefit struggling writers (McCarthey, 2008). Cognitive Strategy Instruction in Writing, Self-Regulated Strategy Development (Graham & Harris, 1993), and the Strategy Instruction Model (SIM) (Kansas University-Institute of Research in Learning Disabilities), are three examples of writing instruction based on the cognitive process approach.

Cognitive Strategy Instruction in Writing (CSIW) is guided by three principles (Hallenbeck, 2002). First, writers participate in all stages of the writing process: planning, organizing, writing, editing, and revising. "Think sheets" are a component of CSIW (Miller, 2009). Think sheets have written cues that help students internalize procedures and strategies for each phase of the writing process (Wong, Harris, Graham, and Butler, 2003). Second, teachers use "think-alouds" to model effective writing. Think-alouds expose the students to a writer's thinking and inner voice (Hallenbeck, 2002). Third, the students learn to appreciate the social aspects of writing by writing for real purposes and real audiences. Students work collaboratively throughout the writing process (Hallenbeck, 2002; Miller, 2009).
Self-Regulated Strategy Development (SRSD) was developed in the early 1980s through the work of Karen Harris and Steve Graham (i.e., leaders related to writing instruction for students with disabilities). SRSD is influenced by competing and complementary affective, behavioral, and cognitive theories related to cognitive-behavioral intervention, the social origins of self-control, self-regulation, and metacognition (Wong et al., 2003). Two principles set SRSD apart from CSIW.

First, embedded in all six stages of SRSD is explicit instruction in self-regulation (Wong et al., 2003). The stages include developing the background knowledge needed to discuss and learn a new writing strategy, discussing the new strategy, modeling the new strategy for the students, memorizing the strategy, supporting the continued use of the new strategy, and independently using the new strategy (Graham & Harris, 2009; Miller, 2009). Aspects of the instruction include goal-setting, self-assessment, self-instruction, self-reinforcement, imagery, and management of the writing environment (Wong et al., 2003). The purpose of the instruction is to help students develop strategic behaviors, self-regulation skills, content knowledge, and motivation (Graham & Harris, 2009).

Second, support is inherent in the SRSD instructional model for the students' effort, the students' use of writing strategies, the students' knowledge of writing genres, students' self-efficacy, and for high levels of engagement (Wong et al., 2003). The students dialogue with the teacher and each other throughout the stages, and their progress and performance is measured by individualized standards (Graham & Harris, 2009).

The third cognitive instructional approach, the Strategic Instruction Model (SIM), was developed by researchers at the Institute of Research in Learning Disabilities at the University of Kansas (KU-IRLD) (now named the Center for Research on Learning).
SIM was designed to teach students how to learn through the use of specific learning strategies for different academic tasks (Wong et al., 2003; Schumaker & Sheldon, 1999). A learning strategy is defined as how students plan, carry out, and evaluate their own performance on an academic task (Schumaker & Sheldon, 1999). Part of the SIM is the Learning Strategy Curriculum. The curriculum's framework includes three strands: (a) acquisition, (b) storage, and (c) expression and demonstration of competence (Miller, 2009). The Sentence Writing Strategy fits into the expression and demonstration of competence strand (Schumaker & Sheldon, 1999). Within each strand are strategies designed to teach students how to learn specific academic tasks, such as sentence writing (Schumaker & Sheldon, 1999). Each strategy is composed of eight instructional stages (Miller, 2009). These stages are (a) pretest and make commitments, (b) describe, (c) model, (d) verbal practice, (e) controlled practice and feedback, (f) advanced practice, (g) posttest and make commitments, and (h) generalization. The generalization stage is divided into four phases: orientation, activation, adaptation, and Maintenance (Schumaker & Sheldon, 1999). The explicitness of this approach is particularly appropriate for students with disabilities who benefit from structured, step-by-step instruction.

There is a common thread that connects CSIW, SRSD, and SIM. Each approach builds on students' meta-cognitive abilities using structured formats designed to teach students how to learn. It is important to note that not all approaches for teaching written expression work for all students. Some students respond positively to one approach, but not another. Thus, it is important for teachers to know about the various approaches and have the skills to implement the ones that are best for his or her students. To date, a
majority of the research related to teaching writing skills to students with disabilities has focused on the use of the various cognitive strategy approaches with students who have learning disabilities. The results have been very positive for this population of students. Limited information is available, however, related to the effectiveness of cognitive strategies for students with other types of disabilities (e.g., autism).

**Statement of the Problem**

Writing is a mandated aspect of the school curriculum that has received increased attention over the past decade. This increased attention began at the federal level and has trickled down to state departments of education as well as local school districts.

**Governmental Standards**

The No Child Left Behind Act of 2001 (NCLB) mandated that state departments of education design statewide accountability procedures aligned with state academic content standards (Bui, Schumaker, & Deshler, 2006). Thus, writing instruction became a government-monitored activity (McCarthey, 2008). In 2003, the United States Department of Education (USDE) required that all states develop writing policies, embed writing in all grade levels and daily course instruction, and have teachers complete courses or programs on how to teach writing (Bui, Schumaker, & Deshler, 2006). School personnel were charged with improving the literacy skills of their respective students, including writing (Schunk & Zimmerman, 2007). Since 2010, forty-five states have adopted the Common Core State Standards for English Language Arts (http://www.corestandards.org/). These standards reflect the feeling among the members of the Council of Chief State School Officers (CCSSO) and the National Governors' Association (NGA) that all students should be college and career ready in literacy no later
than the twelfth grade (http://www.corestandards.org; Courtade, Spooner, Browder, & Jimenez, 2012).

Thus, writing has become an important part of the school curriculum within both elementary and secondary school settings (Chalk Hagan-Burke & Burke, 2005). In many school districts, students are now required to demonstrate writing proficiency in order to graduate with a standard diploma (Deatline-Buchman & Jitendra, 2006). In spite of the increased emphasis on writing instruction, there are many students who still struggle with this aspect of the school curriculum (Parker, Burns, McMaster, & Shapiro, 2012).

**Poor Student Performance in Writing**

The National Assessment of Educational Progress (NAEP) report reflects a 3% increase in the number of eighth graders who performed at or above the Basic writing level from 2002 to 2007. There was no significant change during the same period, however, related to the percentage of students who performed at or above the Proficient writing level. The 2007 NAEP report showed similar trends for students in 12th-grade. There was an 8% increase from 2002 to 2007 in the percentage of students in grade 12 who performed at or above the Basic level, yet there was no significant change in the percentage of students who performed at or above the Proficient writing level. Thus, from 2002 to 2007, more eighth and 12-grade students reached only the minimal standard of basic writing performance and there was no increase related to proficient writing levels (USDE, 2007). In 2007, eighth grade students with disabilities (i.e., students with an Individualized Education Plan) who were attending a public school scored 118 on the NAEP writing scale. Previous assessments revealed that in 2002, this group scored 112, and in 1998 they scored 109 (USDE, 2007). The NAEP writing scale goes from 0 to 300.
Although students with disabilities showed improvement each year their writing skills were measured, they remained at the very low end of the measurement scale.

**Writing Characteristics of Students with Cognitive Disabilities**

In an attempt to identify the causes for poor writing performance among students with disabilities, researchers have investigated the characteristics of students who struggle with writing skills. A majority of this research involves students with learning disabilities (LD). Thus, researchers interested in other disability populations (e.g., students with autism) must consider the work within the field of LD, and attempt to generate hypotheses that may or may not be affirmed with different types of students.

Most students with LD are not skilled writers (Graham & Harris, 2003). They lack meta-cognitive knowledge that is needed for proficient writing (Graham & Harris, 2003; Lin, Monroe, & Troia, 2007; Santangelo, Harris, & Graham, 2008). Declarative knowledge, procedural knowledge, and conditional knowledge are three types of meta-cognitive knowledge (Raphael, Englert, and Kirschner, 1989). Declarative knowledge, when applied to writing, means knowing the audience, purpose, and the structure of the text. Procedural knowledge means knowing the steps in the writing process. Finally, conditional knowledge means understanding how varied writing conditions and the revision process can alter writing procedures (Raphael et al., 1989). Unskilled writers focus on form and mechanics (Santangelo et al., 2008), unlike skilled writers who reflect on content and how best to communicate a message to a specific audience (Santangelo et al., 2008). Writing for an authentic purpose and sharing one's writing with a real audience also contributes to more substantive writing actions, such as revising (Graham, MacArthur, & Schwartz, 1995).
Students with LD also lack self-regulatory behavior (Graham & Harris, 2003; Graham & Harris, 2009). Self-regulation refers to internal thoughts, feelings, and actions that affect a person's acquisition of knowledge and skills in a systematic way (Schunk & Zimmerman, 2007). Self-regulation affects reading and writing achievement (Schunk & Zimmerman, 2007). Students with LD who do not have self-regulation spend minimal time thinking about and planning what they will write (Graham & Harris, 2003). Therefore, students with LD often produce compositions that are short and lack detail (Graham & Harris, 2003). As a result, these students produce lists of information somewhat related to a topic because they have difficulty synthesizing and connecting concepts within a paper.

Students with LD experience challenges related to pre-writing, organization, and editing. When asked to revise or edit their writing, students with LD make superficial changes, such as correcting spelling and punctuation (Graham & Harris, 2003; Lin, Monroe, & Troia, 2007). Their time in the pre-writing stage is short. They usually do not make a plan or goals for writing (Graham & Harris, 2003).

Similarly, although more limited in scope, it has been reported that students with ASD demonstrate a variety of writing deficits specifically related to working memory, syntax, and perspective taking (Pennington, 2009). Students with Asperger's syndrome (AS) show poor legibility, a low level of complexity, and a minimal number of words used during writing activities (Pennington, 2009). They need help organizing their thoughts (Griswold, Barnhill, Myles, Hagiwara, & Simpson, 2002). These students also struggle with handwriting, organization, and addressing abstract concepts (Pennington, 2009). Deficits in motor coordination, such as the fine motor skills employed in
handwriting, have been found in groups of adolescents with autism and with AS (Ghaziuddin, Butler, Tsai, & Ghaziuddin, 1994). Additionally, it has been noted that students with AS construct brief and simplistic sentences (Myles, Huggins, Rome-Lake, Hagiwara, Barnhill, & Griswold, 2003).

Although many students with disabilities, including those with ASD, struggle to achieve proficiency in writing, there continues to be limited research related to evidenced-based writing interventions for these students (Delano, 2007a; Pennington, 2009). The writing ability of students with ASD has been widely ignored by researchers (Pennington, 2009). The lack of evidenced-based writing strategies for students with autism is problematic for a variety of stakeholders. Statistics show more students with disabilities than in prior years are being served in general education programs (McLeskey et al., 2011). Thus, both general and special education teachers are struggling to figure out how to teach writing to students with ASD. The lack of evidenced-based writing strategies for students with ASD also is problematic for students' parents who wonder if their children are receiving quality instruction that will result in functional literacy skills. Finally, it is problematic for the students themselves who have to meet federal and state academic accountability standards in order to graduate, and who will have to acquire the writing skills needed to succeed in life beyond school. Students who have good writing skills are more likely to achieve positive outcomes in school and after leaving school (Parker, Burns, McMaster, & Shapiro, 2012).

In summary, the levels of academic accountability and social responsibility have increased over the years for students with autism because of federal legislation enacted over the decades. In 1975, the Education Act of All Handicapped Children was passed,
making the education of children with disabilities a public responsibility (National Research Council, 2001). The most current reauthorization of this act emphasized the importance of using evidenced-based practices when teaching students with disabilities, yet today there remains a lack of evidence-based strategies designed to educate this student population (Delano, 2007a; National Research Council, 2001). This suggests research is not keeping pace with the law. For instance, more students with ASD receive their academic instruction in general education classrooms today than they did in the past (United States Department of Education, 2001). In addition, the passage of the Individuals with Disabilities Education Act (IDEA) in 2004, opened the classroom door for students with autism to participate in similar writing programs, whenever possible, as their peers without disabilities. They also must participate in similar high-stakes testing (Pennington, 2009). Unfortunately, there is a limited number of empirical studies guiding teachers toward evidenced-based writing interventions to use with students with ASD (Delano, 2007a; Pennington, 2009). It appears that Delano (2007b) is the only researcher to date who has studied the effects of a self-regulated writing intervention on the writing performance of a student with ASD.

The result of limited research in this area is a lack of standardization of effective teaching practices to help students with ASD improve the quality and increase the quantity of their writing. Moreover, an increasing number of parents are demanding that evidenced-based strategies be used when instructing their children who have autism. The lack of standardization is reflected in the way educational services for students with autism vary from one state to another and from school district to school district (National Research Council, 2001). Parents' demands are reflected in a number of judicial filings
brought against school districts by parents of children with autism. The number of decisions favoring school districts is only slightly higher than the number favoring the parents (Zirkel, 2002). Unless more research is conducted in the area of improving the writing performance of students with ASD, parents may eventually begin winning more of these cases, making the lack of evidenced-based writing strategies for students with ASD costly for school districts. This study has the potential to add to the number of evidenced-based writing strategies already in existence and eventually improve the educational, social, and economic outcomes for students with ASD.

**Purpose of the Study and Research Questions**

The purpose of this study is to examine the effects of teaching a sentence writing strategy and a self-monitoring procedure to middle school students with ASD. To address this purpose, the following research questions will be answered

1. Do middle school students with ASD improve their writing performance after receiving instruction in a sentence writing strategy?

2. Do middle school students with ASD improve their writing performance further when a self-monitoring procedure is added to the sentence-writing strategy?

3. Do middle school students with ASD improve their writing performance after receiving strategy instruction and a self-monitoring procedure?

4. Do middle school students with ASD maintain their writing performance one and two weeks after sentence-writing and self-monitoring instruction has ended?

5. Do middle school students with ASD have positive perceptions about the sentence writing strategy and self-monitoring intervention?
6. Do the perceptions students with ASD have of their own writing ability change after learning the sentence writing strategy and the self-monitoring procedure?

**Significance of the Study**

This study is important for three reasons. First, writing is one tool students with ASD can use to communicate with people in their world (Deatline-Buchman & Jitendra, 2006). Their level of social interaction may increase or improve, they may feel more optimistic, and they may learn to understand others’ viewpoints and attitudes (Englert, 1992; Leavitt & Pill, 1995; Slatcher & Pennebaker, 2006; Sloan et al., 2008). It should also be mentioned that the academic success of all students is impacted by their writing skills (Graham & Perin, 2007). Students with sound writing skills do better academically and are more successful later in life (Parker, Burns, & McMaster, 2012). It is a "threshold skill" that influences a person's chance for employment and promotion (National Commission on Writing, 2004). Individuals with limited writing skills have limited opportunities (National Commission on Writing, 2004). They have limited academic and economic opportunities and limited ways to interpret and communicate personal life events. Some writers use the process of writing to order life events and make these events significant for themselves and others (Calkins, 1994). Writing structures and restructures thought processes (Harris, 1989).

Second, students with ASD who learn how to self-monitor can chart their own course. They become students who can decide whether they have progressed as far as they want because they know how to quantitatively measure their success (Goddard & Sendi, 2008). Self-monitoring builds verbal communication and attentional control (Ganz & Sigafoos, 2005). Verbal communication and attentional control are negatively
affected in people with impaired executive functioning, such as students with ASD (Anderson, Anderson, Northam, Jacobs, & Catroppa, 2001; Liss et al., 2001). Thus, self-monitoring has the potential to strengthen weak executive functions. Strong executive functioning suggests someone can self-regulate their behavior for successful outcomes. Students with ASD who learn how to self-monitor learn how to successfully manage their world.

Third, the amount of research in the area of writing interventions for students with ASD is minimal (Delano, 2007a; Pennington, 2009). The research that does exist shows that self-monitoring helps improve time on task and overall academic performance (Harris et al., 2005; Harris et al., 1994). This research included only elementary age participants. It appears that Delano’s (2007b) study has been the only one to show how a self-regulated writing intervention involving self-monitoring increased the writing quantity and quality of a student with ASD.

Clearly, there is a need for more research in the area of sentence-writing strategies and self-monitoring procedures to help adolescent students with ASD. The current study has the potential to contribute to the existing literature and ultimately help teachers of students with ASD as well as the students themselves.

**Delimitations to the Study**

There are two delimitations to this study. First, a sample of convenience was used from one school. Thus, caution must be used when generalizing the findings to students who attend other schools. Second, only students in grades 6, 7, and 8 who have been diagnosed with ASD participated in the study. Thus, caution must be used when
generalizing the findings to students without ASD and to students in elementary or high school grades.

**Definition of Terms**

1. **Academic performance** - This phrase refers to how often a student is engaged in an academic activity (Harris et al., 1994).
2. **Advanced Practice Stage** - This is stage six in the Learning Strategies Curriculum. The purpose of this stage is to increase the initiative and independence of the student by fading and removing prompts and cues (Schumaker & Sheldon, 1999).
3. **Asperger's syndrome (AS)** - This syndrome refers to a neurologically based disorder bearing the name of Hans Asperger, the man who first identified the disorder in 1944. People with the disorder experience problems interacting socially, comprehending abstract meanings, reading social cues and body language, and cognitively retrieving information (Griswold et al., 2002).
4. **Autism Spectrum Disorder (ASD)** – This is a term with an unclear meaning. Some disorders on the autism spectrum include autistic disorder and Asperger's syndrome. These are disorders typically characterized by impairments in communication skills, social interaction skills, and behavior (White, Smith, Smith, & Stodden, 2012).
5. **Cognitive Strategies** - Strategies that emphasize the importance of how individuals think and process information while performing academic tasks (Lenz & Deshler, 2004).
6. **Controlled Practice Stage** - This is stage five in the Learning Strategies Curriculum. The purpose of this stage is for students to build confidence and fluency with the new strategy by practicing the strategy with material at the students' instructional reading level (Schumaker & Sheldon, 1999).
7. Describe Stage - This is stage two in the Learning Strategies Curriculum. During this stage of instruction, the teacher explains the new strategy in a way that entices and motivates the students' buy-in for wanting to learn the strategy (Schumaker & Sheldon, 1999).

8. Executive function - This is a general term referring to a variety of cognitive processes, such as goal setting, planning, organizing, prioritizing, memorizing, initiating, shifting, and self-monitoring (Anderson et al., 2001; Meltzer, 2007).

9. Generalization Stage - This is stage eight in the Learning Strategies Curriculum. Students apply the new learning strategy to natural settings outside of the controlled learning environment of a remedial classroom (Schumaker & Sheldon, 1999).

10. Learning Strategies - "An individual's approach to a task, including how to approach and do the task and evaluation of performance on the task. Also, teacher-taught techniques and ways for students to approach learning tasks" (Lenz & Deshler, 2004 p. 369).

11. Level - "Level refers to the mean score for the data within a phase" (Kratockwill et al., 2010, p. 18). This metric is used in visual analysis of single subject design data.

12. Mnemonic Device - Tools that are created to assist the memory. First-letter mnemonic devices involve the use of a word in which each letter in the word cues a particular step to be performed when completing a task.

13. Model Stage – This is stage three in the Learning Strategies Curriculum. The teacher simultaneously verbalizes and demonstrates the thinking and behavior related to specific learning strategies (Miller, 2009).
14. Proficiency in Sentence Writing Strategy - This is part of The Learning Strategies Curriculum. It is one of the six strategies that make up The Expression and Demonstration of Competence Strand (Schumaker & Sheldon, 1999). The purpose of this strategy is to teach students how to write simple, compound, complex, and compound-complex sentences (Schumaker & Sheldon, 1999).

15. Self-efficacy - This term refers to the perceptions people have of their own capabilities for learning or behaving in specified ways (Schunk & Zimmerman, 2007).

16. Self-evaluation - Students track their progress toward meeting a self-determined goal (Wehmeyer & Shogren, 2008). It allows students to identify the gap separating their current achievement levels and their projected goal. This process may include self-monitoring (Wehmeyer & Shogren, 2008).

17. Self-monitoring - Self-monitoring refers to a cognitive-behavioral strategy (Ganz & Sigafoos, 2005) that represents one component of self-management. It is part of self-regulated learning (Harris et al., 1994). The act of self-monitoring involves a person deciding whether he or she met a targeted behavior and then recording the results (Goddard & Sendi, 2008).

18. Self-regulation - This term refers to peoples' own thoughts, feelings, and actions intended to influence their own learning (Schunk & Zimmerman, 2007).

19. Strategy instruction – Instruction designed to help students become independent learners (Miller, 2009). It involves instruction in how to learn and perform.

20. Trend - "Trend refers to the slope of the best-fitting straight line for the data within a phase" (Kratochwill et al., 2010, p. 18). This metric is used in visual analysis of single subject design data.
21. Variability - "Variability refers to the range or standard deviation of data about the best-fitting straight line" (Kratochwill et al., 2010, p. 18).

22. Verbal Practice Stage - This is stage four in the Learning Strategies Curriculum. Students verbally explain and practice the names of the steps for the strategy. Recitation of the steps should become automatic (Schumaker & Sheldon, 1999).

23. Writing - This is a behavior defined as a basic communicative skill (Deatline-Buchman & Jitendra, 2006).

Summary

There are benefits to having good writing skills. They impact a person's success in school and out of school (Graham & Harris, 2009; Graham & Perin, 2007; Pennington, 2009). Many students leave high school before graduating because their literacy skills are not strong enough to meet the academic demands (Graham & Hebert, 2010). Many students who do finish high school find themselves inadequately prepared for college or for a career (National Commission on Writing, 2004; Graham & Hebert, 2010). These students may face limited economic opportunities (Graham & Hebert, 2010).

Writing may also have therapeutic effects (Graham & Hebert, 2010; Slatcher & Pennebaker, 2006; Sloan et al., 2008; Smyth, 1998; Swedlow, 1999). Writing about personal feelings has been shown to lower blood pressure, decrease depression, and strengthen the immune system (Swedlow, 1999). Researchers and policy-makers are beginning to recognize the benefits of having good writing skills.

In 2003 and in response to NCLB, the USDE directed all states to focus more attention on writing instruction and include more writing in their schools' curriculum (Bui, Schumaker, & Deshler, 2006). In 2010, 45 states adopted the CCSS for English
Language Arts which continued the emphasis on writing instruction. The Council of Chief State School Officers (CCSSO) and the National Governors' Association (NGA) coordinated the adoption effort. Even with increased attention placed on writing and writing instruction, students are still graduating from high school with poor literacy skills (Graham & Hebert, 2010). During the past decade, only a small percentage of students have improved in writing performance (NAEP, 2007). Students with disabilities have made only modest improvements and remain at the low end of the measurement scale (NAEP, 2007). In order to improve the literacy skills of students, more evidence-based instructional practices are needed (Graham & Hebert, 2010).

Additionally, more research is needed in the area of self-monitoring and writing instruction for students with ASD (Delano, 2007a). Previous empirical studies focused on elementary students. They included only participants with LD and only a few researchers looked at the quality and quantity of students' writing. This current study aims to arm general education and special education teachers with an evidenced-based sentence-writing strategy and a self-monitoring procedure designed to improve the quality and quantity of writing produced by adolescent students with ASD.

Chapter two of this dissertation includes an in-depth review of the literature. A description of methodology follows in chapter three. The study's results are presented in chapter four, and a discussion of the results is provided in chapter five.
Chapter 2

A Review of The Literature

This chapter serves four purposes. The first purpose is to summarize and analyze professional literature related to social cognitive theory. The second purpose is to summarize and analyze professional literature related to executive function in students with autism spectrum disorder (ASD), including those with Asperger syndrome (AS) and high functioning autism (HFA). The third purpose is to summarize and analyze professional literature concerned with self-monitoring and students with ASD. The fourth purpose is to summarize and analyze professional literature concerned with strategy instruction and students with ASD. The chapter begins with a description of the literature review procedures followed by a description of the criteria used to identify relevant professional literature. The chapter concludes with a summary and synthesis of the research related to social cognitive theory, executive function in students with ASD, self-monitoring and students with ASD, and strategy instruction and students with ASD.

Literature Review Procedures

PsychInfo was used to identify studies published in peer-reviewed journals. The following descriptors were used: social cognitive theory, executive function and autism, self-monitoring, Asperger syndrome and writing, and self-monitoring and students with autism. A manual search was conducted of several journals included in PsycInfo's database. Specifically, the Journal of Education Research published in 1986, American Educational Research Journal published in 1992, and Child Development published in 1996, were included in the manual journal search. Publication dates of the journals obtained through the electronic and manual search spanned a period of 40 years. Many of the studies related to self-monitoring dated back as far as 1971. The earliest studies
were not included, however, because they concerned self-monitoring and smoking. The last step in this search procedure was an ancestral search through the reference lists of the retrieved articles.

**Selection Criteria**

Studies related to self-monitoring were included in this review if (a) the studies were published in peer reviewed journals, (b) the studies included self-monitoring as an independent variable, (c) the studies included more than one participant, and (d) the studies specifically addressed self-monitoring, self-management, self-regulation, self-evaluation, and/or self-efficacy. Studies related to strategy instruction and ASD were included in this review if (a) the studies were published in peer reviewed journals, (b) the studies included a specific instructional strategy, and (c) participants included students with ASD.

**A Review and Analysis of Studies Related to Social Cognitive Theory: The Theoretical Foundation for Strategy Instruction**

Social cognitive theory explains how individuals' perceptions of the level and the relevancy of self-efficacy within the context of their own socio-structural and psychosocial contexts affects their beliefs in and perceptions of self-determination (Bandura, Barbaranelli, Caprara & Pastorelli, 1996). It demonstrates the importance of giving people efficacy, or giving them strategies they can use to reach self-efficacy, so they can work within their environments to reach pre-determined goals. A person's success after leaving school can be predicted by whether or not they have high levels of self-efficacy and self-determination (Konrad & Test, 2007). The need exists, therefore,
for schools to implement strategies and procedures that give students these important foundational skills (Konrad & Test, 2007).

Schunk and Gunn (1986) conducted a quasi-experimental study and stated two purposes for undertaking their study. The first purpose was to determine how the use of task strategies influenced students' self-efficacy and skills (Schunk & Gunn, 1986). The second purpose for their study was to determine how attributions (i.e., perceived causes) for task successes shaped students' self-efficacy and how task strategies shaped attributions (Schunk & Gunn, 1986).

Fifty participants were included in the study. The participants ranged in age from 9 years, 3 months to 10 years, 9 months. The mean age was 10.0 years (Schunk & Gunn, 1986). The predominantly middle class participants were selected from two elementary schools and included 28 boys and 22 girls. These participants were selected for the study because the children's teachers identified them as having poor division skills (Schunk & Gunn, 1986).

The study was set in a large room inside the participants' school building. The study was conducted over four consecutive school days. Each participant received four 40-minute training sessions (Schunk & Gunn, 1986). A female proctor escorted the participants individually to a large room. Participants were seated away from each other in order to prevent visual or auditory distractions (Schunk & Gunn, 1986).

The pre-test given to the participants measured their levels of self-efficacy. They were each asked to rate their level of certainty on how accurately they could solve a specific division problem. The scale the participants used to rate themselves ranged from high uncertainty to complete certitude (Schunk & Gunn, 1986). The second part of the
pre-test measured participants' skills when it came time to actually solve the problems. The skill test had 18 division problems of varying degrees of difficulty. Problems were presented one at a time to the participants. The higher the number of problems solved correctly, the higher the measure of skill (Schunk & Gunn, 1986).

Four 40-minute training sessions followed the pre-test. Participants received a training packet at each session. The participants were instructed to solve the problems in the packets and verbalize aloud while they solved the problems. They worked on the packets alone, without being able to see the proctors, and without any performance feedback. Verbalizations were recorded for 20 minutes during the fourth session by the proctor.

The verbalizations were meant to measure participants' use of task strategies (Schunk & Gunn, 1986). The proctor showed participants one division problem at a time. The participants were instructed to verbalize aloud while solving the problem. The proctor prompted the participants to verbalize if 10 seconds elapsed without any verbalization. An adult who was unfamiliar with the study, transcribed the participants' verbalizations. After being transcribed, the statements were classified into two groups, task strategies and miscellaneous statements. The final data analyses did not include the miscellaneous statements (Schunk & Gunn, 1986). Statements in the task strategy group were further divided into two groups, effective task strategies and ineffective task strategies. Effective task strategies were task related statements made by the participants directing them toward a correct solution to the problem (Schunk & Gunn, 1986). Ineffective strategies were also task oriented but led the participants toward an incorrect solution (Schunk & Gunn, 1986).
In order to measure the participants' attributions, the researchers gave each one a paper with four scales. Each scale ranged in intervals of 10 from not at all to a whole lot and carried specific labels (Schunk & Gunn, 1986). Each label reflected a specific attribute, such as "good at it," "worked hard," "easy problems," and "lucky" (Schunk & Gunn, 1986). "Good at it" was associated with ability. "Worked hard" was associated with effort. "Easy problems" referred to the task, and "lucky" was associated with luck (Schunk & Gunn, 1986).

The results of Schunk and Gunn's (1986) data analysis were consistent with their initial predictions. Schunk and Gunn (1986) used hierarchical multiple regression to analyze their final data. Data from the five variables, pretest skill, task strategies, attributions, posttest self-efficacy, and posttest skill, were added to each regression equation (Schunk & Gunn, 1986). A path analysis was used to study any theoretical relationships between variables (Schunk & Gunn, 1986). Relationships between variables emerged showing how the effective use of task strategies positively influenced attributions of success to high ability and low task difficulty. The relationship between task strategies and luck and effort showed a negative influence. The attribution with the largest direct effect on self-efficacy was ability. Effort and luck had a negative direct effect on self-efficacy. Self-efficacy showed a strong positive effect on skill which lead the researchers to conclude achievement outcomes were influenced by the use of effective task strategies (Schunk & Gunn, 1986).

This study had several strengths and one primary weakness. Its large sample size suggested experimental results may generalize to similar populations of students. Future studies, however, should include students from lower socio-economic groups and
minority students. The results may be different for these groups. By defining self-efficacy and describing its relationship with cognitive learning, the researchers substantiated the social validity of their study. The researchers also established experimental reliability by showing a 94.6% agreement between the three individuals who classified task strategies (Schunk & Gunn, 1986). The weakness of the study was identified by the researchers themselves. Schunk and Gunn (1986) wanted their results viewed with caution because a hierarchical multiple regression produces more stable regression coefficients when a larger total sample size is used with a smaller number of predictors. Their conclusion, however, is still important because it means teachers need to emphasize to students the importance of using strategies to complete tasks (Schunk & Gunn, 1986).

The importance of using strategies for task completion was echoed in a later experimental study conducted by Zimmerman, Bandura, and Martinez-Pons (1992). The purpose of this correlational study was to determine whether students' prior grades, students' self-efficacy for self-regulated learning, self-efficacy for academic achievement, parent grade goals for their student, and students' own grade goals could be used to predict final grades for their Social Studies class, the primary setting for the study. The study included 102 ninth and tenth graders from two high schools serving lower middle-class neighborhoods. The sample group had 50 boys and 52 girls. The sample group represented Black, Hispanic, Asian, and Caucasian students.

The participants were administered the *Self-Efficacy for Self-Regulated Learning* scale and the *Self-Efficacy for Academic Achievement* scale as part of a questionnaire given to them in the natural setting of their Social Studies class. These are two sub-scales
from the *Children's Multidimensional Self-Efficacy Scales*. The *Self-Efficacy for Self-Regulated Learning* scale measured students' perceptions of their own capability to use different self-regulated learning strategies (Zimmerman et al., 1992). The *Self-Efficacy for Academic Achievement* scale measured students' perceptions of how well they could achieve in mathematics, algebra, science, biology, reading and writing, computer use, foreign language proficiency, social studies, and English (Zimmerman et al., 1992). The researchers analyzed the students' responses using Cronbach alpha reliability tests (Zimmerman et al., 1992).

In order to identify parents' and students' grade goals, Zimmerman et al. (1992) asked the students and the parents to rate their goal expectation for the social studies class and identify the lowest academic grade they would be comfortable with. The students completed this procedure in their social studies class and the parents' questionnaires were sent home with the students. The students returned the completed questionnaires to the school in sealed envelopes. The researchers obtained the students' social studies grades from the prior year from their school records. A path analysis was used to correlate the responses from the students' and parents' questionnaires (Zimmerman et al., 1992).

The results of the study showed students' prior grades influenced parent expectations, students relied on self-efficacy beliefs and parent expectations when setting goals, and self-regulatory factors guided the impact prior achievement had on current academic achievement, as well as positively affecting the participants' academic achievement (Zimmerman et al., 1992). A low correlation was found between students' prior grades and their final grades in a specific social studies course (Zimmerman et al., 1992). The researchers questioned whether this low correlation contributed to or affected
the high correlation between perceived self-efficacy and academic goals and their combined predictive variance for final academic grades (Zimmerman et al., 1992). Zimmerman et al. (1992) concluded this was not a significant concern because of what this low correlation revealed. It showed students' prior achievement and present academic attainment were influenced by self-regulatory factors (Zimmerman, et al., 1992).

These results were supported by the path analysis. The analysis revealed a significant path between three factors: efficacy for self-regulated learning, efficacy for academic achievement, and academic attainment (Zimmerman et al., 1992). The students who viewed themselves as able to strategically regulate their own behavior were confident they could successfully tackle their academics and score higher grades (Zimmerman et al., 1992). If academic achievement and reaching levels of academic proficiency is an educational goal for students, it may not be enough to impose high academic standards. Efforts may need to be directed toward structuring classroom experiences for the purpose of strengthening all students' perceptions of their own academic efficacy (Zimmerman et al., 1992). This conclusion was supported by the results of a study conducted by Bandura, Barbaranelli, Caprara, & Pastorelli (1996).

Bandura et al. (1996) conducted a correlational study for the purpose of studying how socio-economic factors, factors surrounding the family, factors related to peers, and personal cognitive, affective, and behavioral processes interact to determine students' academic achievement. The participants came from two different schools located in an economically diverse residential community near Rome. Their group sample consisted of 279 children. Of this group, 155 children were male and 124 were female. The age
range was from 11 to 14 years. The mean age was 12. The participants attended either the sixth or seventh grade.

Four different scales were administered to the participants in their classes by two experimenters. These scales measured participants' perceived efficacy for academic achievement, perceived efficacy for self-regulated learning, efficacy for leisure and extracurricular activities, and participants' self-regulatory efficacy to resist peer pressure to participate in high risk activities (Bandura et al., 1996). Using a principal components factor analysis with varimax orthogonal rotation, a three-factor structure emerged after studying the participants' responses (Bandura et al., 1996). The factors included academic self-efficacy, perceived social self-efficacy, and perceived self-regulatory efficacy (Bandura, et al., 1996).

Nine additional factors were also measured. These factors included (a) social and emotional behavior, (b) pro-social behavior, (c) depression, (d) peer preference, (e) moral disengagement, (f) problem behavior, (g) parental academic efficacy, (h) parental and children's academic aspirations, and (i) academic achievement (Bandura, et al., 1996). These factors were measured using questionnaires, surveys, and checklists with Likert-type scales. The Children's Depression Inventory and The Child Behavior Checklist were two of the measurement tools used by Bandura et al. (1996). These instruments were reliable and valid (Bandura et al., 1996). The results from The Children's Depression Inventory were analyzed using Cronbach alpha test.

The results were described in four themes: (a) positive perceptions of academic efficacy and educational aspiration positively correlated with socio-economic level, (b) parents who are self-efficacious have high academic expectations for their children, (c)
pro-socialness, peer acceptance, low despondency, rejection of moral disengagement, low levels of emotional and behavioral problems, and high academic achievement positively correlated with children's perceptions of their own academic efficacy and educational aspirations, and (d) the impact of families' socio-economic status on children's academic achievement is tempered by the parents' academic aspirations for their children and children's pro-social behavior (Bandura et al., 1996). Students' perceptions of their self-regulatory efficacy supports academic achievement (Bandura et al., 1996). From these results, Bandura et al. (1996) concluded perceived self-efficacy outweighs self-concept of ability as a predictor of academic success. In other words, if children believe they have some control over their own learning, they will achieve academic success (Bandura et al., 1996).

The strength of this study was that different methods with different sources were used to reduce common method and source biases (Bandura et al., 1996). Although the authors of the study did not describe the selection procedure they followed for identifying participants, the socio-economic diversity of the sample contributes to the generalizability of the study's findings, as does the size of the sample. Bandura et al. (1996) substantiate the reliability of many of the instruments they used. Finally, the educational implications of the study's findings contribute to its social validity.

**A Summary of Research Related to Social Cognitive Theory**

The reviewed studies (Schunk & Gunn, 1986; Zimmerman et al., 1992; Bandura et al., 1996;) showed more similarities than differences. For instance, each study included participants from different socio-economic and cultural groups. Also, the participants in the studies were not described as having a learning disability or other
cognitive or physical disability. Two of the studies included participants with a mean age of 10 and 12 (Bandura et al., 1996; Schunk & Gunn, 1986). The majority of the studies included an almost equal number of male children and female children as participants (Schunk & Gunn, 1986; Zimmerman et al., 1992).

Although the researchers did not implement an instructional intervention and did not account for confounding factors possibly influencing the demonstrated causal relationships and correlations, they did similarly conclude that students who know and strategically use strategies to complete academic tasks perceive themselves as efficacious and in control of their learning.

**A Review and Analysis of Studies Related to Executive Function: The Theoretical Foundation for Self-Monitoring Procedures**

Five studies are reviewed in this section. Four of the studies specifically addressed executive function (EF) in students with autism. The researchers involved in these studies held different views on the impact EF has on the language, social, and cognitive development of children with autism. All the studies defined EF as a cognitive process related to a person's ability to focus, sustain attention, problem-solve, and set a goal. They also defined it as a cognitive process that impacts a person's ability to self-monitor their own behavior. Self-monitoring is considered an aspect of self-management (Ozonoff & Schetter, 2007). Teaching students with ASD self-management procedures (i.e., self-monitoring) is just one way to influence the development, sustainability, and flexibility of EF skills (Ozonoff & Schetter, 2007). The first study provided a description of how EF develops in neuro-typical children from late childhood into adolescence.
Anderson, Anderson, Northam, Jacobs, and Catroppa (2001) conducted a correlational study that served a dual purpose: to detail the developmental progressions in EF from late childhood and into early adolescence and to determine whether progressions are the same for all elements of EF. This study included 138 children. The sample group had 69 boys and 69 girls. Their ages ranged from 11.0 years to 17.11 years. All the participants were divided into six groups, depending on their ages. There was a balance of boys and girls within each group. English was their primary language. The participants did not have a history of atypical development. They did not receive or require special education services, and all participants showed an 80 full scale IQ score. Full scale IQ was determined using the Wechsler Intelligence Scale for Children-III (1991).

Schools in Melbourne, Australia were randomly selected. The schools agreeing to participate were asked to create a sample of students representative of the general school population. Parents were notified through a letter sent home from the school personnel. The parents agreeing to their child's participation in the study completed a questionnaire asking them to detail parental occupation, home language, and their child's medical and developmental history (Anderson et al., 2001). Selection of the representative sample was based on demographic characteristics, such as gender, socio-economic status, and full scale IQ. Socio-economic status was determined using Daniel's Scale of Occupational Prestige (1983). The children who met the selection criteria were individually assessed in their school.

Different aspects of the participants' EF were measured. Attentional capacity, attentional shift/working memory, and goal setting were chosen because these were
aspects shown to exhibit differential maturation patterns during childhood (Anderson et al., 2001). The EF measures chosen aligned with the researchers' working definition of EF, appealed to older children and adolescents, and were already in wide clinical use. The measures also gave researchers a mastery and strategy score for the task (Anderson et al., 2001). Digits Forward, Digits Backwards, and Codes Test were used to measure attentional control. Cognitive flexibility was measured using the Contingency Naming Test (CNT) and the Verbal Fluency Test (VFT). The CNT assesses higher levels of memory and attention, including working memory and selective attention (Anderson et al., 2001). The VFT measures language processes, such as concept formation, abstract thinking, and remembering two rules (Anderson et al., 2001). The Tower of London test (ToL) and the Complex Figure of Rey Test (CFRT) were used to measure goal setting.

Anderson et al. (2001) conducted an analysis of variance (ANOVA) across age groups for SES and IQ. The main effects related to age groups and gender were studied using two-way ANOVA. A post hoc analysis was conducted using Fisher's least significant difference procedure (Anderson et al., 2001). Correlations were used to assess relations between tests. Statistical significance was set at .01. Finally, in order to account for unseen factors possibly influencing test performance, researchers conducted principal components analysis with varimax rotation (Anderson et al., 2001).

Results for attentional control-processing speed showed an increase in attentional capacity and an increase in processing speed into adolescence (Anderson et al., 2001). Statistics also showed a possible growth spurt near 15 years of age in this area (Anderson et al., 2001). Girls processing capacity surpassed boys at this age, according to results from the Digit Span Task and the CNT (Anderson et al., 2001). Results for cognitive
flexibility-monitoring, however, showed only stable scores across age groups (Anderson et al., 2001). Scores did show a maturation of cognitive flexibility-monitoring skills by late childhood (Anderson et al., 2001). The difference in scores between genders reflected that girls produced more words than boys at every age level (Anderson et al., 2001). An early developmental spurt was evident at around age 12 in the goal setting skill area. CFRT results showed scores in accuracy and organization improved at this age for males and females (Anderson et al., 2001).

Anderson et al. (2001) reached four conclusions from their study. First, during late childhood and adolescence, EF skills mature more slowly than in early childhood. Second, there is some evidence of gender differences in the maturation of some EF skills, although Anderson et al. (2001) failed to ascribe a specific cause for these differences. Third, greater attentional capacity and the ability to complete tasks faster are skills more characteristic of older adolescents than younger children. Fourth, results indicated each domain developed at a different pace and independent of the others (Anderson et al., 2001).

The study Anderson et al. (2001) conducted had several strengths and weaknesses. The statistical analysis was strong. Researchers accounted for underlying factors possibly influencing participants' testing performance. They also considered a possible association between the three EF domains. The large sample and specific criteria for participant selection suggested the results may be easily generalized and the study itself replicated. Unlike Liss, Fein, Allen, Dunn, Feinstein, Morris, Waterhouse, and Rapin (2001), Anderson et al. (2001) excluded students with autism. This exclusion eliminated an opportunity to study EF skill development in older students with a
cognitive disability alongside neuro-typical adolescent students. Liss et al. (2001) studied EF in young students with autism alongside same-age peers with developmental language disorder (DLD).

Liss et al. (2001) had three goals for their non-experimental study. First, they looked at the consistency of deficits across specific components of EF. These components included planning, set shifting and perseveration, attention, and rapid retrieval of verbal information (Liss et al., 2001). Second, they addressed the EF commonalities in children with autism (Liss et al., 2001). Third, Liss et al. (2001) studied the relationship between EF tasks and other variables, such as adaptive skills. They predicted a strong relationship between EF tasks and adaptive behavior (Liss et al., 2001). The purpose underpinning all three goals was to provide additional information about EF and children with autism.

This was a follow-up study to one conducted by Rapin in 1996. In the first study, the participants were in pre-school. At the time of the present study, the participants were nine years old. Liss et al. (2001) followed up on participants who had a nonverbal IQ score above 80 on the Wisconsin Card Sorting Test (WCST). The final participant group included 34 children with Developmental Language Disorder (DLD) and 21 children with high functioning autistic disorder (HAD). The majority of the participants were male. Participants in the DLD group were matched with participants in the HAD group on the basis of socio-economic status, full scale IQ, nonverbal IQ, and verbal IQ. Participants in the DLD group had a 10 point higher verbal IQ than the participants in the HAD group (Liss et al., 2001).
Participant performance data were collected after administering a series of tests designed to measure EF, but not one specific component. The WCST measured cognitive flexibility. The WISC-R Mazes measured participants' ability to plan ahead, sequence actions, control responses, and change course of action. The Underlining test measured participants' ability to sustain attention and maintain concentration during a visual search activity. The Rapid Automatized Naming test (RAN) required participants to rapidly name a series of color blocks, letters, and pictures. It measured attention, concentration, and participants' ability to quickly retrieve labels for various stimuli. In addition to these measures, Liss et al. (2001) also administered the Vineland Adaptive Behavior Scales (VABS) and the Wing Autistic Disorder Interview Checklist (WADIC). Not all participants were administered all EF measures (Liss et al., 2001). Group performance differences were calculated with a multivariate analysis of variance (MANOVA).

Results showed when verbal IQ was covaried, the difference in performance on the WCST between high functioning participants with autism and participants with DLD disappeared (Liss et al., 2001). When verbal IQ was not covaried with perseveration, the results showed participants with high functioning autism committed more errors in perseveration on the WCST than the participants with DLD. Liss et al. (2001) concluded verbal IQ, more than non-verbal IQ, was highly correlated with executive tasks and this is something future researchers should consider when studying the differences in EF between participants with autism and those without. They also concluded the format of the WCST may impact performance. Participants with autism did better on a computerized version of the test (Liss et al., 2001). Participant performance data also led
Liss et al. (2001) to conclude EF deficits may not exist in all students with autism, but may exist in subsets of individuals with the disorder (Liss et al., 2001).

Data showing a relationship between EF deficits and autistic symptomatology produced mixed results (Liss et al., 2001). Student performance data from the WISC-R Mazes and the WCST showed significant correlations between EF and social impairment. Performance data from the RAN showed a significant correlation between EF and communication impairment, and a minimal significant correlation between EF and perseverative behavior (Liss et al., 2001). Liss et al. (2001) concluded, however, verbal IQ was a mediating influence in these relationships. If the verbal IQ variance was removed, the relationships disappeared (Liss et al., 2001). Performance on the VABS also did not show a significant relationship between adaptive behavior and EF in the group of participants with autism (Liss et al., 2001).

Liss et al. (2001) described several limitations to their study. The study included only individuals with high functioning autism. Results can only be generalized to this population. Also, executive functions, such as working memory and impulse control were not tested (Liss et al., 2001). In the end, Liss et al. (2001) concluded a multi-causal framework would better serve a more complete understanding of autism because the mediating role of verbal IQ precludes EF deficits from being considered the sole cause of autistic behavior (Liss et al., 2001).

Landa and Goldberg (2005) studied language and EF in a sample of individuals with high functioning autism (HFA). They believed participants would demonstrate impaired performance on specific language related tasks: complex sentence development, assessing abstract language processing, and planning and cognitive
flexibility. Sentence development would be dependent on the participants' ability to plan, language processing would be correlated with cognitive flexibility, and planning and cognitive flexibility would impact social functioning (Landa & Goldberg, 2005). The ability to plan and set shift (cognitive flexibility) are components of EF (Landa & Goldberg, 2006).

Participants included 19 children with autism and 19 neuro-typical children who served as the control group. The mean age of both groups was 11 years. All participants in the autism group were diagnosed with autism by one person on the research team using the Autism Diagnostic Interview-Revised (ADI-R) and the Autism Diagnostic Observation Schedule (ADOS) or the Autism Diagnostic Observation Schedule-Generic (ADOS-G). A full scale IQ of 80 on the Wechsler Intelligence Scale for Children-Revised (WISC-R), the WISC-III, or the Wechsler Adult Intelligence Scale-Revised was used to define participants as having HFA. Landa and Goldberg (2005) conducted screening interviews via telephone to define control group participants as neuro-typical, or without a family history of autism, anxiety disorder, ADHD, OCD, Tourette's Syndrome, depression, schizophrenia, or other neuro-developmental disorders. Participants from each group were individually matched based on gender, age, and full scale IQ, and there were no significant differences between groups in age, IQ, or socio-economic status (Landa & Goldberg, 2005).

Participant performance data were collected over an eight-hour time period divided into three sessions (Landa & Goldberg, 2005). Assessment included measures of expressive grammar, figurative language, and EF. During the language assessments, participants' responses were audio recorded and transcribed. They were scored according
to the test manual guidelines and all participants were individually assessed (Landa & Goldberg, 2005).

Expressive grammar was assessed using two subtests from the Clinical Evaluation of Language Fundamentals-Revised (CELF-R). These measured participants' use of semantics, morphology and syntax, and memory. They also measured the ability to make grammatically and semantically correct simple, compound, and complex sentences. The figurative language subtest of the Test of Language Competence (TLC) was used to assess participants' ability to use and understand figurative language. Executive function was measured using the Cambridge Neuropsychological Test Automated Battery (CANTAB). Components of EF that were assessed included spatial working memory, planning, and cognitive flexibility (set shifting). The CANTAB tasks were computer based and participants responded using a touch screen monitor.

Scores from the CANTAB tasks were automatically calculated using the computer software. Repeated measures ANOVA was used, however, when tasks included more than one level of difficulty within subjects. Connections between EF and language measures were calculated using correlation analyses separately for the control group and the HFA group (Landa & Goldberg, 2005). Correlation analyses were also done to study the link between EF and social variables.

Assessment measures produced mixed results (Landa & Goldberg, 2005). Results showed participants with HFA performed significantly worse than the control group in expressive grammar and figurative language (Landa & Goldberg, 2005). Executive function findings showed participants with HFA made more between-search errors on the spatial working memory task. These results were linked to the level of task difficulty.
The greater the cognitive demand placed on the participants, the more errors they made. Participants with autism also had more problems with the planning task but showed no significant difference between the control group in cognitive flexibility (Landa & Goldberg, 2005).

Current theories support EF as a deficit in individuals with autism, possibly influencing the development of social and language impairments. Results from this study, however, do not support current theories (Landa & Goldberg, 2005). Executive function may not be a core deficit in people with autism, but there may be intra-group differences in EF processes among participants with autism, distinguishing them from children with Asperger’s syndrome (AS) or with pervasive developmental disorder not otherwise specified (PDDNOS). Like Landa and Goldberg (2005), Verte, Geurts, Roeyers, Oosterlaan, and Sergeant (2006) looked at inter-group differences and intra-group differences of EF processes in children on the autism spectrum.

Verte et al. (2006) studied whether neurocognitive executive functioning profiles could be used to differentiate children with HFA, AS, and PDDNOS from each other and from children in a neuro-typical control group. They attributed two purposes to their study. The first purpose was to study the EF of children with HFA, AS, and PDDNOS and determine an EF profile specific to each disorder and then to compare these profiles against the EF profile of children in a neuro-typical control group (Verte et al., 2006). The second purpose was to examine ADHD and OCD in HFA, AS, and PDDNOS, in relation to EF (Verte et al., 2006).

The study included four groups of children between the ages of six and 13. One group had 50 children with HFA. Another group consisted of 37 children with AS. A
third group included 25 children with PDDNOS, and the fourth group had 47 normal control children (NC) (Verte et al., 2006). Participants did not take medication, had a diagnosis based on a multi-disciplinary assessment, did not have a history of epileptic seizures, and had a FSIQ of 80 or higher. Questionnaires (i.e., the Children's Communication Checklist (CCC), the Disruptive Behavior Disorder rating scale (DBD), and the Leyton Obsessional Inventory-Parent Version (LOI-PV)) were completed by parents and teachers for the purposes of establishing the NC and for identifying comorbid disorders in the clinical groups (Verte et al., 2006).

Participants were individually tested. Testing was administered in three sessions. The WISC-R was administered to the participants in the first session. The neuropsychological measures were administered in the second and third sessions (Verte, et al., 2006). Participants in the clinical groups were assessed at an unnamed university or in the setting where they were normally treated. Participants in the NC were assessed at their school during regular school hours (Verte et al., 2006). Measures were administered to participants individually and in a set order (Verte et al., 2006).

A variety of measures were used to assess specific EF tasks (Verte et al., 2006). Stop Signal Reaction Time (SSRT) and Change Mean Reaction Time (MRT) were used to measure change task. Circle time difference was used to measure the circle-drawing task. The Test of Everyday Attention for Children, Subtest Opposite Worlds (TEA-Ch) was used to measure inhibition. Self-Ordered Pointing Task, Abstract Designs (SoP) was used to measure visual working memory. The Tower of London (ToL) was used to assess participants' ability to plan. The Wisconsin Card Sorting Test (WCST) was used to measure participants' cognitive flexibility or set shifting. The ability to formulate
novel responses was assessed using the Verbal Fluency test. Change Task, Primary Part was used to measure response time and process. The Benton Visual Retention Test (BVRT) was used to measure participants’ visual-spatial abilities and their visual short-term memory. The Corsi Block Tapping Test was included to also measure visual-spatial memory and to control for visual short-term memory in the SoP. Participants' semantic memory and categorization skills were measured with the Categories of the Snijders-Oomen Nonverbal Intelligence Test-Revised (SON-R). The Beery Visual Motor Integration test was included to measure participants' visual-motor integration (Verte et al., 2006).

Six group contrasts were studied in three phases of analysis using the data from the different measures (Verte et al., 2006). The group contrasts included HFA against NC, AS against NC, PDDNOS against NC, HFA against AS, HFA against PDDNOS, and AS against PDDNOS. In the first phase, ANOVAs and MANOVAs were conducted to analyze EF and non-specific measures, such as the BVRT, the Change Task, Primary Part, the Corsi Block Tapping Test, and the SON-R. In the second phase, groups were compared. In the third phase, Verte et al. (2006) controlled for ADHD and OCD characteristics using a canonical correlation analysis. This three-phase analysis revealed the following results and led Verte et al. (2006) to several conclusions.

The three clinical groups demonstrated more difficulty than the NC group in the area of inhibition. The three clinical groups performed similarly and the HFA and AS groups were slower than the NC group once age and FSIQ were covaried (Verte et al., 2006). In the visual working memory domain, the NC group had fewer errors than the HFA group, even after controlling for age and FSIQ. The AS group made more errors.
than the PDDNOS group, even after controlling for age and FSIQ (Verte et al., 2006). There were significant differences in the results from the planning measures between the groups. The HFA and AS groups scored lower on the ToL than the NC group. The NC group, however, had a slower decision time than all three clinical groups. The HFA group needed more time to complete the task than the NC group and PDDNOS groups, and the AS group needed significantly more time than the NC group (Verte et al., 2006). In the area of cognitive flexibility, the NC group performed better on the MRT than the three clinical groups. After controlling for age and FSIQ, however, the difference between the group performances disappeared. On the WCST, the PDDNOS group demonstrated more perseverative behavior than the NC group (Verte et al., 2006). With regard to verbal fluency, the NC group outperformed the three clinical groups in the semantic category and outperformed the HFA and PDDNOS groups in the letter category (Verte et al., 2006).

Giving consideration to the area of response execution, more variability in speed of responding was demonstrated among the three clinical groups than with the NC group. After controlling for age and FSIQ, the differences disappeared. The NC group made fewer errors than the HFA and AS groups and this contrast remained even after controlling for age and FSIQ (Verte et al., 2006). On the subject of short-term memory, the NC group scored higher on the Corsi than did the HFA and AS groups. Once controlling for age and FSIQ, however, the contrast was no longer significant. On the BVRT, the NC group scored higher than the three clinical groups (Verte et al., 2006). In the area of categorization, although the NC group performed better than the three clinical groups, any group contrasts were insignificant after controlling for age and FSIQ. With
consideration given to the area of visual-motor integration, the NC group scored better than the PDDNOS group. Again, controlling for age and FSIQ caused the group contrast to disappear (Verte et al., 2006).

The results of this study led Verte et al. (2006) to six specific conclusions. First, children with HFA and children with AS may have similar EF profiles. Second, the EF profile of children with PDDNOS may rest between the profiles of children in the NC group and between children in the HFA and AS groups. Third, children in the PDDNOS group showed difficulty with inhibition. Fourth, children who have PDDNOS may perform poorly on EF tasks and also exhibit ADHD symptoms. Fifth, atypical EF may play a significant part in autism. Sixth, although EF is moderately connected to PDDNOS behavioral symptoms, this may be attributed to undefined cognitive problems or to comorbidity with ADHD (Verte et al., 2006).

The study is limited in several ways. It did not have a sound research framework for EF. A sound framework would help provide research and analysis of specific disorders and how they may relate to EF strengths and weaknesses (Verte et al., 2006). Strict criteria, other than language development, is needed to distinguish subgroups within the autistic spectrum (Verte et al., 2006). Finally, EF domains cannot always and definitively be measured by EF tasks. Some tasks cross over into other domains (Verte et al., 2006).

Hill and Bird (2006) conducted a study similar to the one conducted by Verte et al. (2006). Like Verte et al. (2006), Hill and Bird (2006) planned an inter-group and an intra-group comparison (Hill & Bird, 2006). Their purpose was to determine if a difference existed in the executive processes of adults with AS and adults in a normal
control group. Hill and Bird (2006) targeted three EF domains: (a) planning, (b) mental flexibility, and (c) generativity (Hill & Bird, 2006). The study also focused on any possible correlation existing between executive dysfunction and autistic symptomatology.

Twenty-two adults previously diagnosed with AS according to American Psychological Association (APA) criteria comprised one group and 22 typically functioning adults comprised the control group (Hill & Bird, 2006). Males were the majority in each group. The mean age of the participants with AS was 31.09 years and the mean age of the participants in the control group was 33.45 years. The mean FSIQ of the participants with AS was 110.5 and the mean FSIQ of the control group participants was 107.91 (Hill & Bird, 2006). The participants with AS were individually matched with a participant from the control group using general ability level, age, and gender as qualifiers (Hill & Bird, 2006).

All participants were administered six tests of executive function: (a) Behavioral Assessment of the Dysexecutive Syndrome, (b) Hayling test, (c) Modified Card Sorting test, (d) Stroop test, (e) Trail-making test, and (f) Verbal fluency. They were also administered two tests of autistic symptomatology: (a) Autism Spectrum Quotient, and (b) Communication Checklist (Hill & Bird, 2006). The researchers did not describe how the tests were administered, in what order they were given, or where they were administered.

Scores were first analyzed for group differences and then analyzed for individual differences (Hill & Bird, 2006). Independent t-tests and Mann-Whitney tests were used for the group analysis. A significant group performance difference was found in 11 of 22 comparisons (Hill & Bird, 2006). Although the AS group showed no impairment in their
performance on the tests, the results indicated a deficit in EF in participants with AS (Hill & Bird, 2006). Consequently, deficits in EF may exist in all the participants or they may exist in a sub-group of participants with AS. In order to precisely identify the location of the EF deficits, Hill and Bird (2006) used a multiple case series approach to analyze individual test performance.

From their results, Hill and Bird (2006) drew five conclusions. First, participant performance on the classical tests of EF indicated no difference between the group with AS and the control group. Second, performance on the newer tests, such as the Six Elements sub-test of the BADS and Hayling test, showed larger differences between the two groups. Third, deficits exist in specific domains of EF in adults with AS. The greatest dysfunction was in response initiation and intentionality (Hill & Bird, 2006). Fourth, there is a link between EF and autistic symptomatology. Fifth, the EF profiles of adults with different developmental disorders may one day serve as indicators of specific disorders (Hill & Bird, 2006).

This was a non-experimental, correlational study, with an almost balanced number of strengths and limitations. It included two well-matched groups of participants. Unlike prior studies, this study focused on adults with AS. Also, the inter-group and intra-group comparison of participant test results showed executive dysfunction on a group and individual level. What is missing, however, is a sound operational definition of executive function.

**A Summary of Research Related to Executive Function**

Participants on the autism spectrum were found to have EF profiles different from neuro-typical control groups (Hill & Bird, 2006; Liss et al., 2001; Verte et al., 2006).
The results from the study conducted by Hill and Bird (2006) showed differences between groups only when they were administered current tests, such as the BADS and the Hayling test. Results from classical tests yielded no differences (Hill & Bird, 2006). Differences were not found, however, in EF profiles between groups of participants with different disorders on the autism spectrum. The EF profile of participants with HFA was similar to the EF profile of participants with AS (Verte et al., 2006). Results from one study do not support the theory EF deficits impact social and language processes in participants with autism (Landa et al., 2005), while another study showed symptoms of ADHD may impact verbal fluency and planning in participants with PDDNOS (Verte et al., 2006). Two studies mentioned a correlation between EF and autistic symptomatology (Hill & Bird, 2006; Verte et al., 2006), and one study showed results too mixed to draw this conclusion (Liss et al., 2001). The majority of researchers concluded that differences in EF profiles exist within groups of participants on the autism spectrum (Hill & Bird, 2006; Landa et al., 2005; Liss et al., 2001; Verte et al., 2006). The results of one study did suggest response initiation and intentionality as the greatest dysfunction in the executive processes of people with AS (Hill & Bird, 2006).

A Review and Analysis of Studies Related to Strategy Instruction for Students With ASD

This section includes a discussion of three experimental studies related to teaching specific strategies to high-functioning adolescents with autism for the purpose of improving their social skill performance, writing performance, and test-taking performance. Each study extends prior research conducted on specific learning strategies that were previously used with students with learning disabilities. The results of the
studies included here contribute to the current literature related to strategy instruction and high-functioning adolescents with ASD.

Webb, Miller, Pierce, Strawser, and Jones (2004) examined how teaching the SCORE Skills Strategy program to high-functioning adolescents with autism worked to improve their use of five social skills needed to participate in cooperative groups. The study included a small group of participants with autism. Ten males were included in the study. Their ages ranged from 12.3 to 17.2 years. The mean age was 14.8 years. The participants were in grades 6 through 11. The percentage of time each participant spent in the general education setting ranged from 17% to 100%. The participants' verbal intelligence quotient (VIQ) ranged from 74 to 126. Performance intelligence quotient scores (PIQ) ranged from 53 to 136, and full scale intelligence quotient scores (FSIQ) ranged from 81 to 132. Scores for expressive language and receptive language ranged from 81 to 119 and 75 to 110, respectively (Webb, Miller, Pierce, Strawser & Jones, 2004).

The setting for the study was "a community public agency building" (Webb et al., 2004, p. 54). Two rooms within the facility were used for instructional and assessment purposes. The organization of each room was determined by their purpose. The room used for instruction had three tables with four chairs at each table. Each table was a different color. The room used for assessment had two chairs facing each other and a third chair next to a video camera. The data collector used the video camera during the role-play tests (Webb et al., 2004).

The instructional program and materials used in the study included the SCORE Skills Strategy Program, role plays, and games (Webb et al., 2004). The SCORE Skills
Strategy Program is used to teach children five skills they need to cooperate with others in small group situations. These skills include (a) share ideas, (b) compliment others, (c) offer help or encouragement, (d) recommend changes nicely, and (e) exercise self-control (Webb et al., 2004). These skills can be broken down into a series of steps that the participants can use when interacting with others in small groups. They are also accompanied by three body language expectations (e.g. voice sound, facial expression, and eye contact) (Webb et al., 2004). The role plays were created so the participants could practice and demonstrate competence of each of the five skills. The games included table games and scramble-and-slide puzzles that could be completed in 30 minutes or less (Webb et al., 2004).

The researchers used tests, checklists, and surveys to measure seven factors. These factors included (a) participants' performance in the role-play situations, (b) the participants' knowledge of important social skills that are needed to successfully interact in a cooperative group, (c) the participants' ability to discriminate which social skill should be used in a specific situation, (d) the participants' perceptions of what it is like to work in small groups, (e) the participants' satisfaction with the SCORE Skills Strategy, (f) the perceptions of the parents of the participants as they related to the changes in the social skills of their child, and (g) the satisfaction of the parents of the participants with the SCORE Skills Strategy (Webb et al., 2004).

In order to measure the participants' performance in the role-play situations, the researchers used a checklist that included components of each skill. The participants were given a score of 0, 1, or 2 depending on the quality of their performance of each component for each social skill (Webb et al., 2004). The researchers measured the
participants' knowledge of social skills by using a Skill Knowledge Survey (Webb et al., 2004). A Situation Discrimination Test was used to measure the participants' ability to identify which skill should be used in a given social situation (Webb et al., 2004). The Subject Opinion Survey was used in the study to measure the participants' perceptions of what it is like to work in small groups. The Subject Satisfaction Questionnaire was given to the participants so the researchers could measure their feelings about the SCORE Skills Strategy. The Social Skills Rating System (SSRS) and the Parent Satisfaction Questionnaire were each given to the parents to complete so the researchers could measure the perceptions and satisfaction of the participants' parents related to how they saw their child's social skills change as a result of having been taught to use the SCORE Skills Strategy and how satisfied the parents were with the program overall (Webb et al., 2004).

Webb et al. (2004) conducted a multiple-baseline-across-skills study. They also included a multiple-probe design that was replicated once and at the same time as the 13 instructional sessions. The purpose of including a multiple-probe design was to measure the participants' demonstration of a specific social skill (Webb et al., 2004). The study included four phases. In Phase I, the teachers and researchers participating in the study were trained in the SCORE Skills Strategy. Phase II was baseline. In Phase III the participants were given instruction in the SCORE Skills Strategy. Instruction took place over 13 sessions that were held two times per week. Each session lasted 60 minutes (Webb et al., 2004). The post-assessments were given in Phase IV. The post-assessments included the Skill Knowledge Survey, the Situation Discrimination Test, the Opinion Survey, and the Subject Satisfaction Questionnaire (Webb et al., 2004).
Pre- and post intervention group mean scores for each of the five social skills were compared by \( t \)-tests. Statistical significance was found for "compliment others," "offer help or encouragement," "recommend changes nicely," and "exercise self-control." Statistical significance was not seen for "share ideas" (Webb et al., 2004). The multiple-probe design was used to collect data on individual pre- and post intervention performance. The results from these data showed a 20% or more gain between pre- and post intervention scores among 60% of the participants (Webb et al., 2004). Based on these results, Webb et al (2004) concluded that the five social skills of the SCORE Skills Strategy can be mastered by high-functioning adolescents with autism. They also concluded that the SCORE Skills Strategy can be mastered by these same subjects while working in a cooperative group setting (Webb et al., 2004).

The study conducted by Webb et al. (2004) has several strengths and limitations. Webb et al. (2004) reported strong reliability for the role plays (91% interscorer agreement) and the Skill Knowledge Surveys (96% agreement). They also reported a 100% interscorer agreement for the Situation Discrimination Test, the Opinion Survey, the Subject Satisfaction Questionnaire, the SSRS, and the Parent Satisfaction Questionnaire.

The participants' performance of the five social skills improved as a result of instruction in the SCORE Skills Strategy. In addition, the participants were able to generalize these skills to new situations (Webb et al., 2004). The highest gains the participants made were in the area of identifying which skill to use in a given situation (Webb et al., 2004).
In addition to its strengths, the study carried out by Webb et al (2004) has some limitations. The study included a small number of participants, and the participants that were included came from one region (Webb et al., 2004). Because the study was conducted in a school that was unfamiliar to the participants, the results from this study may not generalize to the participants' natural school settings. Also, family involvement may have contributed to the participants' overall performance and this is a factor that may not always be present in future studies involving the SCORE Skills Strategy (Webb et al., 2004).

Unlike the study conducted by Webb et al. (2004), Delano (2007a) conducted a study that examined the impact the Self-Regulated Strategy Development (SRSD) had on the writing development of an adolescent with ASD. Delano's (2007a) purpose for her study was to give a first look at how effective SRSD instruction would be for a student with ASD (Delano, 2007a).

Delano's (2007a) study included one male participant who was 12 years old and had been diagnosed with ASD. A psychologist who was not connected to the study made the diagnosis. The participant showed average intelligence. He had difficulty in writing and had limited keyboarding skills. Handwriting was also a slow and tiring process for him. The study was conducted in the participant's school setting, during regular school hours, and in a room next to the researcher's office (Delano, 2007a).

Delano (2007a) used a multiple baseline design across responses. She defined responses as the participant's use of action words, describing words, and revisions. The materials Delano (2007a) used in her study included picture-writing prompts, lined paper, pencils, a laptop, graph paper, and planning sheets. They were available throughout the
study for the participant to use. The picture writing prompts were developed by Delano (2007a) after she had interviewed the participant about his interests.

During baseline, Delano (2007a) picked a picture-writing prompt at random. The participant wrote something related to the prompt for an unspecified amount of time. After the participant indicated he was done writing, data were collected on total words written, action words, describing words, and revisions. The participant's written work was also given a quality rating (Delano, 2007a).

Strategy training took place after the baseline condition. The participant received training in action words, describing words, and revisions. The strategy training followed the SRSD model. Once training in the three strategies (i.e., actions words, descriptive words, and revisions) was completed, the participant was given three post-training story probes. The procedures for administering the post-training story probes replicated the baseline procedures (Delano, 2007a). One follow-up session was administered two weeks after the last set of post-training story probes was given.

Delano (2007a) used the descriptions given by Graham and Harris (1989, 2005) to define the dependent measures used in her study. Total number of words written was defined as all written words, misspelled or not, that stood for a spoken word. Action words were defined as words that describe what people, things, or animals do. Describing words were defined as words that describe physical properties or quantity (Delano, 2007a). Revision was defined as any changes made to the written product that altered the meaning of the text. This included adding extra information (Delano, 2007a). A holistic writing scale was developed for this study that was used to determine the
The quality of the participant's writing samples. It measured the participant's use of organization, word choice, focus, and elaboration (Delano, 2007a).

Three line graphs were created to analyze the data for each of the three responses that were measured (i.e., number of action words, number of describing words, and number of revisions). An analysis of the data revealed that after the participant received instruction modeled on SRSD, the number of action words, descriptive words, and revisions the participant used increased (Delano, 2007a). The total number of words the participant used also increased, in addition to the overall quality of his writing (Delano, 2007a). Delano (2007a) was led to conclude from the results of her study that SRSD was an effective intervention for improving the quality and increasing the quantity of the participant's writing samples. Strategy instruction in action words, descriptive words, and revisions caused an increased use of each of the dependent measures (Delano, 2007a).

The strength of Delano's (2007a) study can be derived from measures of reliability. Inter-observer agreement was 100% for total words written and revisions. It was between 83% and 100% for action words, between 80% and 100% for describing words, and between 80% and 100% for quality (Delano, 2007a). In addition, treatment fidelity was maintained at 100% for all phases of the study (Delano, 2007a).

Researchers can only demonstrate replication of their dependent measures, however, when more than one participant is included. The small sample size Delano (2007a) used poses a threat to the study's external validity and creates a limitation to how extensively the results could be generalized to similar populations. In addition, this study did not take place in the participant's regular classroom. Therefore, it is unclear how the
intervention Delano (2007a) examined would work in the participant's natural educational setting. More studies are needed that examine the effects of teaching adolescent students with ASD strategies for learning more effectively and for demonstrating the knowledge they attain.

Songlee, Miller, Tincani, Sileo, and Perkins (2008) conducted such a study for the purpose of examining the impact teaching a Test-Taking Strategy to adolescent students with ASD had on the participants' ability to take tests successfully. They designed a multiple-probe study. It included a baseline, an instruction, a generalization, and a Maintenance phase (Songlee, Miller, Tincani, Sileo, & Perkins, 2008). The participants included four males who ranged in age from 12.1 to 17.8 years (Songlee et al., 2008). They spent the majority of their school day in the general education setting. Their full-scale IQ scores ranged from 110 to 140 (Songlee et al., 2008).

The study was conducted in a school unfamiliar to the participants and after regular instruction ended. Three rooms in the school were used for the purposes of the study. The participants were provided pizza, tacos, sandwiches, and water. All the participants attended the experimental sessions (Songlee et al., 2008).

The Test-Taking Strategy (Hughes, Schumaker, Deshler & Mercer, 2002) was the intervention used in the Songlee et al. (2008) study. This strategy includes scripted lessons. These lessons are organized into eight instructional stages (Songlee et al., 2008). The strategy itself was designed to be used with adolescent students who have a learning disability and can read at the fourth grade level or higher (Songlee et al., 2008). The instructional materials used in this study were not modified for the participants (Songlee et al., 2008). The instructor's manual for the Test-Taking Strategy included 13 probe
tests, probe test score sheets, advanced practice tests, advanced practice score sheets, and generalization tests (Songlee et al., 2008). The pretests, controlled practice tests, posttests, and Maintenance tests were used as the ongoing measures in this study (Songlee et al., 2008). Criterion for mastery on the probe tests was 90%. Participant data collected throughout all phases of the study were visually analyzed using line graphs.

The results of the study show that learning the Test-Taking Strategy improved the test-taking performance of all the participants (Songlee et al., 2008). Participant One experienced an 89% improvement from baseline to the end of the instruction phase. Participant Two showed an 87% improvement. Participant Three showed a 124% improvement, and Participant Four showed a 113% improvement (Songlee et al., 2008). The results also indicate that all participants were able to generalize the Test-Taking Strategy and use the steps of the strategy to reach performance mastery on different kinds of tests (Songlee et al., 2008). In addition, three of the four participants reached mastery on both Maintenance probes. The fourth participant reached mastery on one of the Maintenance probes (Songlee et al., 2008). Songlee et al. (2008) concluded that high-functioning adolescents with ASD could learn the Test-Taking Strategy and use it to increase their test-taking performance.

Although the study showed positive results, it does have some strengths and limitations that are worth noting. This study adds to the current literature related to strategy instruction and high-functioning adolescents with ASD. In addition, the results from this study support and extend earlier findings from other researchers who also examined the effects of the Test-Taking Strategy on students with disabilities other than ASD (Songlee et al., 2008). There are five limitations, however, Songlee et al (2008)
ascribed to their study. First, the study was conducted outside of the regular school day making it unclear how well the participants would have used the Test-Taking Strategy in their natural learning environment. Second, the small number of participants raises questions about the generalizability of the results to other high-functioning adolescents with ASD. Third, researcher bias may have impacted the results of the study because it was the researcher who designed the tests used for generalization. Fourth, the setting was unfamiliar to the participants so how well they would have learned the Test-Taking Strategy in a more familiar setting and generalized its use is unknown. Fifth, two weeks may not have been enough time after the end of instruction to administer the Maintenance probes with the purpose of determining the participants' retention of the Test-Taking Strategy (Songlee et al., 2008). These limitations may detract from the strengths of the study, but they may also lead other researchers to examine the impact teaching specific learning strategies to high-functioning adolescents with ASD has on their academic achievement.

A Summary of Research Related to Strategy Instruction for Students With ASD

The three previously discussed studies contribute to the base of literature related to evidence-based instructional practices for high-functioning adolescents with ASD. Each study was designed to examine the effects of an already validated learning strategy for students with learning disabilities on a new population of students (i.e., those with ASD). The studies have their own individual limitations and strengths. For example, each study was conducted outside the participants' natural educational setting and the small sample sizes used in the studies limit the generalization of the results. Overall,
however, the studies show that teaching learning strategies to high-functioning adolescents with ASD will improve their social skill performance, their writing performance, and their test-taking performance. Clearly, additional research is needed to provide greater confidence related to the use of strategy instruction for students with ASD, especially in the area of writing performance. In addition to finding only one study that involved the assessment of strategy instruction for teaching writing to students with ASD, there was only one participant included in the study.

A Review and Analysis of Studies Related to Self-Monitoring Procedures for Students With ASD

The experimental studies related to self-monitoring and individuals with ASD that were located and reviewed were quite diverse in terms of participant ages. The studies included participants at the pre-school level, elementary level, and post-secondary level. Each study used a single-subject design. Self-monitoring was used as an intervention in each study, but for different purposes. The results from each study showed the potential for self-monitoring to help students with autism of any age achieve social and behavioral success.

Odom and Watts (1991) conducted a study that had two purposes. First, these researchers wanted to see what would happen with the social interactions of a group of pre-school children with autism when teachers’ verbal prompts were replaced with combined correspondence training and visual feedback. Second, they wanted to study the social interactions of pre-school children with autism and how they were affected by peers’ initiations (Odom & Watts, 1991). Participants included three pre-school-aged boys with autism. Two of the boys were five years old and the third boy was three and a
half years old. All the participants met the criteria for autism described in the Diagnostic Statistical Manual-III (DSM-III). At the beginning of the study, the participants demonstrated almost no social interaction with their peers (Odom & Watts, 1991). The study also included four normally developing pre-school-aged children, two boys and two girls. All the participants attended the same integrated pre-school class (Odom & Watts, 1991).

The pre-school classroom was the setting for the study. Ten children attended the class: six children with developmental disabilities and four normally developing children (Odom & Watts, 1991). The classroom was located in an elementary school and was affiliated with a Midwestern university. Students attended class four hours every day.

Data were collected through observations of the children with autism and peer sociometric ratings administered to the four normally developing children at the end of the study (Odom & Watts, 1991). The observational data collected included the number and type of social interactions the child with autism was engaged in. Interactions were categorized into nine categories. These included share, share request, play organizer, assistance, assistance request, affection, complimentary statement, negative motor-gestural, and negative vocal-verbal (Odom & Watts, 1991). Observers recorded the child's behavior as either an initiation or a response for each category. The data collected from the peer sociometric ratings indicated how much the four normally developing children liked to play with each class member (Odom & Watts, 1991).

This was a five-phase study: baseline, peer-initiation intervention, peer initiation and correspondence training/visual feedback (CTVF), second baseline, and CTVF alone. The first two phases included a multiple baseline with an embedded multi-element
component (Odom & Watts, 1991). The baseline phase included the teacher introducing an activity to one or two normally developing children, one child with autism, and sometimes a child with developmental disabilities who was not part of the study. Any social interaction between these students while engaged in the activity was not prompted or reinforced by the teacher (Odom & Watts, 1991). During the peer initiation phase, the four normally developing children were trained in how to interact and encourage interaction with the children with autism. Training took place in a separate classroom and lasted approximately 20 minutes (Odom & Watts, 1991). During the peer initiation and CTVF phase, the normally developing children set a goal and self-monitored their progress toward meeting their goal using the visual feedback from their teacher. First, they told their teacher they would get their friend (the peer with autism) to play. Second, they needed to do what they said they would do (Odom & Watts, 1991). Each time they got their friend to play, the teacher held up a happy face. After earning eight happy faces, the teacher rewarded them. The second baseline phase was implemented exactly as the first to establish experimental control for CTVF (Odom & Watts, 1991). In the last phase, the peer initiation intervention was discontinued and CTVF was implemented earlier in the day to show the effectiveness of CTVF independent of other interventions and regardless of the time of day it was implemented (Odom & Watts, 1991). Data were analyzed by calculating the mean number of teacher prompts per session. Observational data were recorded on a line graph.

The results of the study conducted by Odom and Watts (1991) showed peer initiations and the social interactions of the children with autism increased dramatically when CTVF was implemented with peer-initiation intervention. When CTVF was
implemented by itself and at a different time, peer initiations and positive social interactions increased (Odom & Watts, 1991). This study had several strengths. Observer reliability was established before the study began to a .75 (kappa) criterion (Odom & Watts, 1991). Also, data collection was conducted by a second observer at the same time as the primary observer during 32% of the total number of sessions. Two forms of interobserver agreement were analyzed, composite and component. By category, the mean and range of kappa coefficients were .88 (Odom & Watts, 1991). Odom and Watts (1991) acknowledged their study also had some limitations. Had CTVF not been followed by the peer-initiation intervention, outcomes may have been different. They also recognized their study did not consider Maintenance and believed the effects of CTVF would not have maintained had their study included a Maintenance phase (Odom & Watts, 1991). Also, the specific population of students included in the study caused Odom and Watts (1991) to caution against generalizing their results to other populations of children. It may also be important to note that it was the normally developing children who were taught to set a goal and monitor their own progress toward meeting their goal.

The study of Odom and Watts (1991) and the study of Sainato, Goldstein, and Strain (1992) had similar purposes. Sainato et al. (1992) conducted a study for the purposes of determining whether self-evaluation increased the use of trained peers facilitative strategies when teacher prompts were removed, whether there was an increase in the social behavior of peers with autism when their trained peers showed an independent use of facilitative strategies, whether trained peers use of facilitative strategies influenced untrained typical peers to increase their use of facilitative strategies,
and whether peers generalized their use of facilitative strategies to other classmates with autism (Sainato et al., 1992).

Participants attended an integrated pre-school in a large elementary school located in an urban district. Six typical children were chosen and six children with autism were selected for participation. The typical children ranged in age from 3.11 years to 4.7 years. These children were teacher recommended because they were cooperative and played better than others (Sainato et al., 1992). General cognitive scores ranged from 118 to 150, according to the results from the McCarthy Scales. The children with autism ranged in age from 3.7 years to 4.8 years. Their general cognitive scores ranged from 49 to 80, according to results from the McCarthy Scales of Children's Abilities. All the participants with autism rated moderately autistic on the Childhood Autism Rating Scale (Sainato et al., 1992). The participants were divided into three triads. One child with autism, one peer trained in facilitative strategies, and one untrained peer composed each triad (Sainato et al., 1992). The study was conducted in the natural setting of the participants' integrated classroom during a 30-minute free play period.

Four specific facilitative strategies were taught to the neuro-typical peers by an experimenter. They were taught these strategies one at a time during fifteen 20-minute sessions in their classroom. The facilitative strategies included attention getters, play organizers, shares, and responses (Sainato et al., 1992). Neuro-typical participants also received self-evaluation training. This training was conducted individually with each participant in the classroom for approximately 10 minutes. Training lasted for up to six sessions (Sainato et al., 1992).
The study was conducted using a multiple baseline design across subjects (Sainato et al., 1992). The phases included baseline, post-training, self-evaluation, and generalization. During baseline, the teacher introduced the activities. She reminded the children about the facilitative strategies verbally and by pointing to the posters. During playtime, she provided a minimal number of prompts reminding students to use the strategies (Sainato et al., 1992). The researchers do not indicate how long the baseline phase lasted, but once it ended, and after 15 days of teaching the facilitative strategies, participants entered the post-training baseline phase. Again, the teacher introduced the activity, monitored student behavior, and provided minimal prompts. The self-evaluation phase started when the level of social interaction stabilized for each triad (Sainato et al., 1992). Probes were conducted in the generalization phase to assess whether trained peers could use the facilitative strategies in another structured playtime with other target peers. During this phase, teachers were asked not to prompt the children (Sainato et al., 1992).

The results of the study showed a slight difference in strategy use between the baseline phase and the post-training baseline phase. The use of the facilitative strategies spiked in the self-evaluation phase (Sainato et al., 1992). Graphs showed teacher prompts were reduced more during the self-evaluation phase. Results also showed social behavior increased in frequency after the self-evaluation intervention was introduced. In the generalization phase, the results showed children used the facilitative strategies, but at rates similar to or lower than when used in the primary setting (Sainato et al., 1992). Sainato et al. (1992) concluded from these results it was not enough to teach pre-school children facilitative strategies to improve their social interaction. Further training in self-evaluation was also needed (Sainato et al., 1992).
This study had three strengths and one limitation linked to the results. First, the study extended prior research on the topic of the effects of self-evaluation on pre-school children's interactions (Sainato et al., 1992). Second, reliability was established. It was demonstrated with 80% interobserver agreement and replication of similar results across subjects. It also supported self-evaluation as an alternative to high rates of teacher prompting (Sainato et al., 1992) when neurotypical children are taught how to self-evaluate their social interactions with their peers, including those with autism. Sainato et al. (1992) pointed out the study's limitation. They acknowledged the presence of a confounding effect. Strategy use and self-evaluation were reinforced at the same time (Sainato et al., 1992).

Shearer, Kohler, Buchan, and McCullough (1996) also conducted a single-subject study on the interactions between pre-school children with autism and their non-disabled peers. They conducted a combined alternating treatment and multiple baseline design (Shearer et al., 1996). The purpose of their study was to examine how the activity engagement and social interactions of pre-school children was effected by self-monitoring (Shearer et al., 1996). Participants included three pre-school age boys. Each child had a confirmed diagnosis of autism according to DSM-III criteria (Shearer et al., 1996). Participating peers included nine children without disabilities ranging in age from three to five years old. Each child had already been enrolled in the program (Shearer et al., 1996). The setting for each experimental session was a small playroom the participants knew because they used it prior to the study (Shearer et al., 1996). Observational data using the Classroom Structure Code and Social Interaction Scale were collected on adult and child behavior.
All three target children and their peers participated in the baseline phase (Shearer et al., 1996). They engaged in sociodramatic play and manipulative activities for eight minutes. The adults did not intervene unless conflicts arose. Baseline criteria were not described. Social skills training was implemented after baseline and before the introduction of the alternating intervention. Social skills training consisted of six 10-15 minute sessions and included the target children and their non-disabled peers (Shearer et al., 1996). During training, participants learned three different strategies, initiating interactions, responding to other children's initiations, and persistent initiation (Shearer et al., 1996). They also learned how to self-monitor their use of these strategies. The alternating intervention condition included the alternation of two monitoring procedures from one day to the next (Shearer et al., 1996). These procedures consisted of the adult monitoring procedure and the child monitoring procedure. During the child monitoring procedure, children were observed monitoring their own behavior (Shearer et al., 1996). Criteria for moving from the alternating intervention condition to the follow-up condition were not described. The purpose of the follow-up condition was to observe the participants independently monitoring their use of the specific strategies. The results were analyzed using non-statistical methods. Results from observations were recorded and analyzed as data points on line graphs. After analyzing their data, Shearer et al. (1996) reported two results. First, even when used by an adult or a child's peer, prompts, monitoring, and reinforcement worked to increase the interactive play of all the children because even the children with autism were taught self-monitoring. Second, self-monitoring effectively maintained the engagement of the neuro-typical children and of the children with autism even when adult prompts were absent (Shearer et al., 1996).
Although the results showed self-monitoring worked to positively affect pre-school children's interactions in the absence of adult prompts, it is necessary to mention the strengths and limitations of the study. The reliability of the results may be a strength for this study. Reliability was assessed using inter-rater agreement. Two observers simultaneously scored using the same code for each category (Shearer et al., 1996). Reliability for the Classroom Structure Code was above 90% for teacher behavior, activity structure, child behavior, and social context. Reliability for the Social Interaction Code was 80% and higher across individual categories (Shearer et al., 1996). Another strength of this study, as well as being a limitation, was the way the children's natural school environment became the setting for the study. Data were not collected in a contrived, clinical atmosphere, consequently, the results may be more easily generalized to similar pre-school student populations and settings. This was also the study's shortfall because researchers were used to implement the research conditions, not the children's teachers (Shearer et al., 1996). Also, children with a narrow range of developmental abilities were included in the study (Shearer et al., 1996). A final limitation involved the duration of the experimental conditions. Overall, the duration of the intervention lasted from four to 10 sessions. More time was needed to study children's long-term Maintenance of gains shown during the intervention phase (Shearer et al., 1996).

Like Shearer et al. (1996), Ganz and Sigafoos (2005) conducted a study with the purpose of examining the effects of self-monitoring on the behavior of individuals with autism. The purpose of the Ganz and Sigafoos (2005) study was to examine whether a self-monitoring procedure taught to two young adult males, one with autism and the other with severe mental retardation, would increase independent vocational work and verbal
requests for help. The two participants included in the study were both severely impaired in many ways.

The first participant was male, Caucasian, 20 years old, and was diagnosed with autism, mental retardation, and speech/language impairment. He was also legally blind and was assessed at 12 years old as having an IQ of 20. His adaptive behavior was assessed at 2.6 years, according to results on the Vineland Adaptive Behavior Scales (VABS). School records indicated this participant had no verbal language. Instead, he used a communication book with pictures. His goal was to independently complete a task within five minutes (Ganz & Sigafoos, 2005). The second participant was male, Mexican-American, 19 years old, and was diagnosed with mental retardation and other health impairments (seizures). When he was 13 years old he was assessed as having an IQ of 34. When he was administered the VABS, his adaptive behavior was assessed at 4.1 years. Although he had intelligible, spontaneous speech, he rarely spoke spontaneously or made requests. His goal was to request help by saying help, naming an item he needed, or by other verbalizations (Ganz & Sigafoos, 2005).

The study was conducted in the participants' natural public school setting. It was a self-contained vocational school designed for students with disabilities (Ganz & Sigafoos, 2005). Data collection and training were conducted during vocational tasks. The self-monitoring materials for the first participant included three centimeter square tokens, a plastic container with the number of tokens he needed to earn inside, and a laminated piece of paper with line drawings indicating the work he needed to do and the reward he would earn for completing the work (Ganz & Sigafoos, 2005). The materials for the second participant included a small container with three-centimeter blocks.
Attached to the container were line drawings showing he should ask for help and the reward he could earn (Ganz & Sigafoos, 2005).

Ganz and Sigafoos (2005) used a changing criterion design. Data were collected once or twice a day during five-minute sessions spanning 3-5 days per week (Ganz & Sigafoos, 2005). Event recording was used to collect data. Data were recorded each time a target behavior occurred. During baseline, the participants sat at study carrels with their work. They were not offered rewards for completing their work or for requesting help. Their teachers only provided verbal and gestural prompts as reminders to complete the task (Ganz & Sigafoos, 2005). During self-monitoring training, the first participant was shown how to remove a token from the container and put it on his laminated sheet. When all his tokens were on the sheet, he was taught how to take the picture of his reward and go to his reward. There was a token in the container for each task he needed to complete. The second participant was given similar instruction. Instead of placing tokens on a laminated sheet, however, he snapped together blocks. The number of blocks in his container corresponded with the number of tasks he needed to complete (Ganz & Sigafoos, 2005). Self-monitoring booster sessions provided practice until each participant showed he could use his own self-monitoring system independently.

The data collected showed the following results: (a) target behavior for each participant was not observed at baseline, (b) self-monitoring training caused an increase in the number of times target behaviors were observed, (c) participants more often independently took a token after the self-monitoring booster sessions (Ganz & Sigafoos, 2005). Ganz and Sigafoos (2005) concluded self-monitoring was effective for increasing both participants' target behaviors. They also concluded students with severe disabilities
can be shown how to self-monitor and successfully derive social and academic benefits from the strategy (Ganz & Sigafoos, 2005).

This study had several strengths and limitations. The fact that not many studies conducted in the past included young adults as participants in this kind of study served as a strength. Also, self-monitoring has been shown to work with students with high-functioning autism or Asperger's syndrome, but not commonly with young adults with severe cognitive and physical disabilities, including autism. Another strength was in the reliability of the study. A mean of 100% inter-observer agreement was calculated for on-task completion and a mean of 92% for independent use of the token system for the first participant (Ganz & Sigafoos, 2005). Mean inter-observer agreement for the second participant was 98% for requesting and 94% for independent use of the token system (Ganz & Sigafoos, 2005). This study did not include Maintenance and generalization data, however, thus contributing to its overall limitations (Ganz & Sigafoos, 2005). Despite its limitations, self-monitoring was demonstrated as an effective intervention strategy for use with people with autism.

The study conducted by Holifield, Goodman, Hazelkorn, and Heflin (2010) also showed positive results when using self-monitoring with children with autism. Their purpose was to look at the effectiveness of self-monitoring on the ability of children with autism to attend to task, thereby increasing academic accuracy (Holifield et al., 2010). The fifth grade male student and the third grade male student included as participants in this study had previously demonstrated problems attending to task. They both received special education services in a self-contained classroom for students with autism. The
self-monitoring intervention was implemented in the self-contained classroom during mathematics and language arts instruction (Holifield et al., 2010).

The implementation of the intervention lasted approximately six days. It was introduced individually to each student after the baseline phase per the parameters of a multiple baseline across participants design. First, the teacher provided instruction in the content area, either mathematics or language arts (Holifield et al., 2010). Once it was time for the participants to begin their independent seatwork, the teacher laid a self-monitoring sheet on the side of the participants' desks. After five minutes, the teacher prompted the participant using words and gestures to record whether they had attended to task. Participants marked their sheets either yes or no every five minutes for a total of 20 minutes (Holifield et al., 2010).

Different data collection procedures were used in order to determine the study's results. Attending-to-task data were collected using a momentary time sampling procedure. The speech pathologist, the autism paraprofessional, and the teacher collected these data during the first 20 minutes of the independent practice time in language arts and mathematics (Holifield et al., 2010). Accuracy data were recorded using a permanent product method (Holifield et al., 2010). The results of the study indicated attending to task and academic accuracy immediately increased for both participants when self-monitoring was implemented in language arts and in mathematics (Holifield et al., 2010). Holifield et al. (2010) concluded a functional relationship exists between self-monitoring and increased levels of attending to task and academic accuracy.

As with the earlier studies, this study had several strengths and limitations. Two strengths of the study concern its reliability and social validity. First, a comparison of the
participants' own observations of their behavior and the trained observers' observations resulted in a mean agreement of 90% (Holifield et al., 2010). Second, the results of this study have strong social validity. Attending to task and academic accuracy are significant behaviors relevant to student success and independence (Holifield et al., 2010).

Three limitations to the study concern its design, ease of teacher implementation, and generalization. Because a Maintenance phase was not included in the overall design of the study, the study does not show if the increases in attending to task and academic accuracy would have extended over time (Holifield et al., 2010). Also, the teacher needed to cue the students to self-monitor every five minutes. Using prompt recordings may be more efficient and convenient (Holifield et al., 2010). Finally, because autism is a spectrum disorder, Holifield et al. (2010) acknowledged their study's results may not generalize to other populations of students with autism, particularly because there is limited research on self-monitoring as an intervention with students who have autism.

A Summary of Research Related to Self-Monitoring Procedures for Students With ASD

The differences and similarities between the studies demonstrate a need for more experimental studies related to self-monitoring and students with autism. For instance, self-monitoring was the primary intervention examined in each study, yet each study had a different purpose. Three studies examined the effectiveness of self-monitoring or its derivative, self-evaluation, for the purpose of understanding its effectiveness to increase the social interactions of children with autism (Odom & Watts, 1991; Sainato et al., 1992; Shearer et al., 1996). Self-monitoring, or self-evaluation, was taught to the students with
autism in Shearer et al. (1996) study only. One study looked at self-monitoring for the purpose of demonstrating how it may improve the functional skills of young adult students with severe cognitive impairments and autism (Ganz & Sigafoos, 2005). Finally, Holifield et al. (2010) studied self-monitoring for the purpose of demonstrating it as an intervention for helping children with autism improve their classroom behavior. Academic performance was not directly addressed as a primary purpose for studying self-monitoring with children with autism. Also, Ganz and Sigafoos (2005) were the only researchers to conduct a study including post-secondary school age individuals, thereby demonstrating a need for more studies including older students as participants. Although the results from these studies indicated that self-monitoring is an effective intervention for increasing social, behavioral, and vocational target behaviors of people with autism, the small sample sizes make generalizing the results difficult. Also, although all of the reviewed studies involved individuals with ASD and self-monitoring, it is interesting to note that none involved students who were middle school age, nor did any of the studies involve the use of self-monitoring to improve writing skills. Clearly, there is a need for additional research in these areas.
Chapter 3

Methodology

The purpose of this study was to investigate the effects of a sentence writing strategy and a self-monitoring procedure on the writing performance of students with ASD. At this time, limited research exists that involves investigations related to the effectiveness of teaching learning strategies to students with ASD, especially related to writing skills. Additionally, there is limited research exploring connections between the writing performance of students with ASD and self-monitoring (Delano, 2007a). This study represents an attempt to fill this research gap. The specific purpose of the study was to examine the effects of teaching a sentence writing strategy and a self-monitoring procedure to middle school students with ASD. To address this purpose, the following research questions were answered

1. Do middle school students with ASD improve their writing performance after receiving instruction in a sentence writing strategy?

2. Do middle school students with ASD improve their writing performance further when a self-monitoring procedure is added to the sentence-writing strategy?

3. Do middle school students with ASD improve their writing performance after receiving strategy instruction and a self-monitoring procedure?

4. Do middle school students with ASD maintain their writing performance one and two weeks after sentence-writing and self-monitoring instruction has ended?

5. Do middle school students with ASD have positive perceptions about the sentence writing strategy and self-monitoring intervention?
6. Do the perceptions students with ASD have of their own writing ability change after learning the sentence writing strategy and the self-monitoring procedure?

This chapter is organized into six sections. These sections include descriptions of the participants and participant selection, setting, instrumentation, experimental design, procedures, and data analysis. Each of these sections includes specific details related to the study methodology.

**Participants and Participant Selection**

Five middle school students with ASD served as participants in this study. There were four males and one female. Three participants were Hispanic, one was Asian, and one was white. The participants' ages ranged from 12.1 to 14.7 years. There was one participant in sixth grade, two participants in seventh grade, and two participants in eighth grade. All five participants had autism, and one of the five also received speech and language services. The participants' intelligence scores ranged from 73 to 98. Intelligence scores were unavailable for two of the five participants. Each of the participants spent some of their school day in general education settings. The amount of time in the general education settings ranged from 40% to 100%. Demographic data related to each individual participant is reported in Table 1.

**Participant Pool**

The participants were selected from a sample of convenience within one middle school. Initially, all students with ASD who attended the school were identified with the assistance of the school personnel. Once this identification took place, specific selection criteria were applied to determine who would become participants in the study.
Selection Criteria

The five participants included in this study met six specific criteria. First, they were in the sixth, seventh or eighth grades. Second, each participant had an Individualized Education Plan (IEP). Third, a spectrum disorder was the primary diagnosis for each participant, according to the multi-disciplinary report and the information included in the IEP. Fourth, participants had a full scale IQ (FSIQ) between 70 and 115. Fifth, participants showed deficits in written language, according to the information included in their IEP. Sixth, participants signed an assent form and their parents signed a consent form allowing participation in the study.

Table 1

Participant Demographic Data

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</table>

Note. M = male; F = female; H = Hispanic; W = White; A = Asian.
Setting

This study took place in a junior high school in an older, suburban area of a large metropolitan city in the southwestern region of the United States. The school is part of the fifth largest school district in the nation. The school itself is more than 30 years old. At the time of this study, approximately 900 students attended the school. According to the school's 2011-2012 School Accountability Summary Report, the most recent published accountability report, 584 of the total number of students were Hispanic (i.e., approximately 65%), 140 were White (i.e., approximately 16%), and 77 were Black/African American (i.e., approximately 9%). The school had a 94.9% daily attendance rate and a 28.5% transiency rate. Seven hundred and eight students met the eligibility requirements for participating in the free and reduced lunch program, as defined by federal government regulations. There were 87 students with IEPs.

The study was implemented within the school, by the researcher, and in the researcher's classroom. The classroom was a semi-circular shaped room. It had two teacher desks. The desks were across from each other on opposite sides of the room. Fourteen student desks were arranged in rows. The room was equipped with a Smartboard, a document camera attached to an LCD projector, and five computers for the students to use.

Instrumentation

Pretest and Posttest

The participants took two pretests and two posttests. One pretest came from the Proficiency in the Sentence Writing Strategy Instructor's Manual (Schumaker & Sheldon, 1999). It consisted of a one page list of eight topics: (a) My Favorite Meal, (b) Summer
Activities, (c) The Best Things About School, (d) Life as a Teenager, (e) The Best Place to Live, (f) My Favorite Sport, (g) The Best Job in the World, and (h) My New Year's Resolutions (see Appendix A). Participants chose one topic and wrote six sentences about it within 20 minutes. Participants received scores in three areas: (a) percentage of complete sentences, (b) percentage of complicated sentences, and (c) percentage of complicated sentences punctuated correctly.

The participants' responses were scored using the Sentence Score Sheet included in the Proficiency in Sentence Writing Strategy Instructor's Manual. The percentage of complete sentences was calculated by dividing the number of simple, compound, complex, and compound-complex sentences by the total number of sentence attempts by the participant. The percentage of complicated sentences was calculated by dividing the number of compound, complex, and compound-complex sentences by the total number of sentence attempts. The percentage of complicated sentences punctuated correctly was calculated by dividing the number of compound, complex, and compound-complex sentences punctuated correctly by the total number of complicated sentences. The posttest was the same as the pretest and was scored using the same procedures as those used for the pretest.

The Test of Written Expression (TOWE) served as the second pretest and posttest. The TOWE is norm-referenced and designed for use with students who are 6.6 years through 14.11 years of age. The TOWE includes an Examiner's Manual, a Profile/Examiner Form, and a Student Booklet (McGhee, Bryant, Larsen, & Rivera, 1995). McGhee, Bryant, Larsen, and Rivera (1995) described four purposes for the TOWE. First, it identifies students who have problems with writing. Second, it identifies
students' writing strengths and weaknesses. Third, it can be used to assess student progress in writing. Fourth, it can be used for research purposes to study writing (McGhee et al., 1995).

The TOWE is an untimed test, but it is expected that administering all parts of the test will take less than one hour (McGhee et al., 1995). It took two days to administer all parts of the TOWE to the participants in the study. The TOWE was used to evaluate students' writing skills in two ways. First, the test included 76 items that measured the students' knowledge and use of capitalization, punctuation, spelling, ideation, semantics, and syntax (McGhee et al., 1995). All 76 items were not administered to the participants for the purpose of meeting basal and ceiling requirements. Second, the students were given the beginning of a story and were instructed to continue the story in essay form. The essay was scored in the areas of ideation, vocabulary, grammar, capitalization, punctuation, and spelling (McGhee et al., 1995). Ideation was assessed through examining story sequence and determining whether names are given to characters. Words that had more than seven letters and were correctly spelled supported the assessment of vocabulary and spelling (McGhee et al., 1995). Overall, students could earn a maximum of 30 points for the essay. Raw scores were assigned for each of the two parts of the test. The raw scores were converted to percentiles, grade equivalents, and standard scores (McGhee et al., 1995).

Participant Perceptions of Writing Efficacy Questionnaire

The Writing Efficacy Questionnaire was designed to measure the participants' perceptions of their writing ability. This instrument was administered before baseline and at the end of the second intervention: self-monitoring phase. The purpose of the
questionnaire was to determine whether a change in the participants' attitudes about their writing ability took place as a result of learning the sentence-writing strategy and the self-monitoring procedure. The questionnaire included five items that asked the participants to measure their attitude about their writing. It consisted of a five-point Likert scale. The participants responded by marking "Strongly Disagree," "Disagree," "Neither Disagree nor Agree," "Agree," or "Strongly Agree" (see Appendix B).

**Social Validity Survey**

The Participant Satisfaction Survey was administered at the end of the second intervention: self-monitoring phase. The purpose of the survey was to assess consumer satisfaction with the sentence writing strategy and the self-monitoring procedure and to identify whether the participants would continue to use the strategy and the procedure after the study ended. The survey included five items that asked the participants to measure their satisfaction with the strategy and the self-monitoring procedure using a five-point Likert scale. The participants responded by marking "Strongly Disagree," "Disagree," "Neither Disagree nor Agree," "Agree," or "Strongly Agree" (see Appendix C).

**On-Going Curriculum Based Probes**

The procedures for administering on-going curriculum probes at baseline, intervention, and Maintenance resembled those for the first pretest. The participants chose a topic to write about from a list provided (see Appendix D). They were also allowed to choose a topic not on the list. Individual participant's scores were determined using the Sentence Score Sheet included in the Proficiency in the Sentence Writing
Strategy Instructor's Manual (Schumaker & Sheldon, 1999). Student responses were scored using similar criteria as for the pretest.

**Materials**

**Proficiency in Sentence Writing Strategy: Instructor's Manual**

The Proficiency in the Sentence Writing Strategy: Instructor's Manual (Schumaker & Sheldon, 1999) includes scripted lessons for instructors to follow when teaching students simple sentences, compound sentences, complex sentences, and compound-complex sentences. For the purpose of this study, four participants only received instruction in simple sentences and one only received instruction in compound sentences. Each sentence type is taught in eight stages, and the lessons for each stage are detailed in the instructor's manual. The authors of the manual (Schumaker & Sheldon, 1999) also included evaluation guidelines that give teachers parameters for scoring students' pretests and posttests, as well as definitions and examples of each type of sentence. The instructor's manual also has enrichment activities and instructional materials for teachers to reproduce.

**Proficiency in Sentence Writing: Student Lessons**

This book includes all the lessons and quizzes that students need to complete to reach mastery in the sentence writing strategy. It also has the guidelines a teacher follows when assessing students' work. Answer keys are also included. The material in this book was used to make the student strategy notebooks.

**Student Strategy Notebook**

The student strategy notebook was a three-ring binder that was sectioned with dividers. Within each section were the students' lessons, cue cards, pretest, sentence
score sheets, and progress monitoring charts. The teacher/researcher assembled the student strategy notebooks with all materials the participants needed to receive instruction in the sentence writing strategy.

**Student Self-Monitoring Notebook**

Each participant was given a college ruled spiral notebook. After receiving instruction in the self-monitoring procedure, each participant used the notebooks for free writes over the course of three sessions. The participants monitored their writing using the sentence-writing checklist included as part of the sentence writing strategy. The researcher modified the checklist to include elements of the self-monitoring procedure (see Appendix E).

**Design**

A single-subject multiple baseline across participants design was used in this study. Using this design, the participants were exposed to the interventions in a systematic and sequential order (Barlow et al., 2009). The use of the multiple baseline design met five purposes. First, it helped determine whether a functional relationship between the independent and dependent variables existed (Horner & Baer, 1978; Horner et al., 2005; Walker, Shippen, Alberto, Houchins, & Cihak, 2005). The independent variables are the sentence writing strategy and self-monitoring procedure and the dependent variables are writing quantity and writing quality. Second, this design protected against threats to internal validity because of the use of repeated measures (i.e., on-going curriculum based probes), and by showing a replication of effects (Aeschleman, 1991), (e.g., changes in writing quantity and writing quality). Third, it provided a targeted analysis of each individual participant when the interventions were implemented.
(Holcombe et al., 1994; Horner et al., 2005). This represents the power of the multiple baseline across participants design (Barlow et al., 2009). Fourth, the multiple baseline design provided a practical view of how individualized interventions, like the sentence writing strategy and self-monitoring procedure, impacted the overall writing performance of middle school students with ASD (Horner et al., 2005). Fifth, this design was conducive to conducting research in a typical educational setting (Horner et al., 2005).

**Experimental Control**

Experimental control in single subject designs is demonstrated when the dependent variables are functionally independent and functionally similar (Gast & Ledford, 2010). In other words, writing quantity did not affect writing quality. At the same time, writing quality did not impact writing quantity (Gast & Ledford, 2010). Change was seen in each dependent variable only when the independent variables, the sentence writing strategy and self-monitoring procedure, were introduced. Functional independence and functional similarity were established by clearly defining the dependent variables. This also assisted with the establishment of reliability (Horner et al., 2005).

**Definitions of Dependent Variables to Assist with Reliability**

Writing quantity was defined as the number of words written in timed 20-minute writing sessions. Writing quality was determined based on the number of quality indicators a participant included in his or her writing samples. Appendix F lists the predictive indicators for writing quality (Gansle et al., 2002). Gansle et al. (2002) and Marston (1989) found CBM instruments to be reliable and valid for assessing writing samples. The studies Marston (1989) summarized used test-retest, parallel forms, and
inter-rater agreement to derive reliability estimates for CBM procedures in written expression. These estimates are summarized in Appendix G. Gansle et al. (2002) used interscorer agreement and alternate forms.

**Content Validity**

The design's structure was based on the description provided by Gast and Ledford (2010). Baseline levels were established for each target behavior, writing quantity and writing quality. Interventions were introduced to participants once a recommended minimum of three baseline scores for each participant had been collected (Barlow, 2009). Criterion-level performance at baseline meant the data points showed zero celeration or a contra-therapeutic trend (Gast & Ledford, 2010). Target behaviors were simultaneously and continuously monitored during the baseline phase, the intervention phases, and the Maintenance phase (Gast & Ledford, 2010). In order to demonstrate valid outcomes, the study continued to replicate until all target behaviors were treated with the interventions and all the participants concluded the Maintenance phase.

The multiple baseline design in this study had four conditions: Baseline, Intervention 1: The Sentence Writing Strategy, Intervention 2: The Self-Monitoring Procedure, and Maintenance. On-going curriculum-based writing probes were administered at Baseline, Intervention 1: The Sentence Writing Strategy, Intervention 2: The Self-Monitoring Procedure, and Maintenance. On-going curriculum-based writing probes were administered throughout each phase.

**Procedures**

There were three phases in this study. Phase I involved preparation for the study. Phase II involved data collection (pretests, baseline probes, intervention probes, posttests,
and Maintenance probes). Phase III involved data analysis to answer the research questions.

**Phase I: Study Preparation**

Prior to data collection, it was first necessary to complete the paperwork required by the Institutional Review Board (IRB). The paperwork was completed and submitted electronically through the IRB’s website. The consent and support of the principal of the school site where the study took place was acquired with an in-person meeting with the principal prior to submitting the paperwork to the IRB. After the IRB approved the study, the appropriate personnel in the school district administrative office was forwarded the approval from the IRB along with the necessary paperwork needed to make a request to conduct research at the school site.

Once the support of the school district and school site personnel was obtained, the next step was to identify the students who matched the criteria for participation in the study. The school’s resource teachers helped in the identification process. The parents of the students who were identified were mailed letters that introduced the researcher, explained the purpose of the study, and described the study itself. The letters were followed by phone calls from the researcher. The researcher explained that participation in the study was voluntary, their child's information would be kept confidential, and that their child could choose not to continue his or her participation in the study at any time during the course of the study. In addition, the parents were told that they could meet with the researcher to ask specific questions and get more details about the study. All the parents who were contacted by the researcher responded positively and gave verbal consent without expressing a desire to meet in person. The consent form was sent home
and returned by the student with their parent's signature. The researcher met one-on-one with the students whose parents gave consent. These meetings were held at the students' school. The purpose of these meetings was for the researcher to explain the study to the students, review the student assent form, and for the students to sign the assent form. The assent form was taken from the IRB's website and modified to fit this study.

**Phase 2: Data Collection**

**Pretest Administration.** The pretests were administered in two separate testing sessions in the participants' school. In the first session, participants were given a list of topics from The Proficiency in Sentence Writing Strategy Instructor's Manual (Schumaker & Sheldon, 1999). They chose one topic to write at least six sentences about. The participants' responses were scored using the criteria in the instructor's manual and on the sentence score sheets. Additionally, the number of words written by the participants were counted, as well as the frequency of each of the quality writing indicators. The responses were scored by two people for data reliability purposes. The researcher entered the results into an Excel spreadsheet. The participants also completed the Participant Survey of Writing Efficacy.

In the second session, the participants were administered the TOWE. This is an untimed test that was administered and scored by the researcher who is also a licensed teacher. A second person also manually scored the participants' responses. The researcher entered the scores into an Excel spreadsheet.

**Baseline condition.** The baseline condition took place after school in the researcher's classroom. Although Horner et al. (2005) suggested a minimum of five data points during baseline, this researcher established baseline criteria on Barlow et al. (2009)
and Gast and Hammond (2010), who suggested a minimum of three data points during baseline to reduce the amount of time participants had to wait to begin instruction.

During the baseline condition, participants selected a writing topic from a provided list (see Appendix A). They were asked to write at least six sentences about their selected topic. After 20 minutes, the researcher collected the students' writing probes, counted the words, checked and recorded the frequency of the quality indicators, and measured the writing against the predictive indicators of quality. The participants' writing probes were also given a percentage score using the scoring criteria and the sentence score sheets in The Proficiency in Sentence Writing Strategy Instructor's Manual (Schumaker & Sheldon, 1999). Baseline ended when stability with minimal variability was seen. These baseline procedures were followed for each participant.

**Intervention 1: Sentence Writing Strategy condition.** The Intervention 1: Sentence Writing Strategy condition took place after school in the researcher's classroom with the exception of Participant 2 who received instruction the last hour of the school day in the researcher's classroom. Participants entered this condition one at a time and after meeting specific criteria (i.e., stable baseline with minimal variability). Monitoring continued, however, of the other participants in the baseline condition per the parameters of the multiple baseline design.

Intervention 1: The Sentence Writing Strategy condition consisted of six instructional stages: Make Commitment, Describe, Model, Verbal Practice, Controlled Practice, and Advanced Practice. These instructional stages were based on those included in The Proficiency in Sentence Writing Strategy Instructor's Manual (Schumaker & Sheldon, 1999).
In stage one, Make Commitments, the researcher made a verbal and written commitment to the student to teach him or her the sentence writing strategy (Schumaker & Sheldon, 1999). The student also made a verbal and written commitment to learn the strategy. Verbal commitments, in particular, increase the motivation of older students (Lenz, Schumaker, Deshler, & Beals, 2007). The written commitments were kept inside the students' strategy notebooks.

In stage two, Describe, the researcher defined and described the sentence writing strategy. This is when the researcher "sold" the idea of the strategy to the students and discussed how it may benefit their academic life (Lenz et al., 2007). Also, the participants learned the mnemonic device PENS: P-pick a formula, E-explore the words to fit the formula, N-note the words, and S-search and check (i.e., Search for the subjects and the verbs. Check for capitalization, punctuation, and whether the sentence makes sense.). Stage two ended with the students writing a goal for learning the strategy. Writing a goal may increase students' motivation to quickly learn the strategy (Lenz et al., 2007).

In stage three, Model, the researcher demonstrated each step of the sentence writing strategy. The participants saw how to apply PENS to their own writing. They also saw how to apply formulas to write different types of simple sentences. The theory behind stage three is students learn best when they see performed what is expected of them and then have the opportunity to imitate and practice the skill independently (Lenz et al., 2007).

In stage four, Verbal Practice, the participants memorized the steps of the mnemonic device (i.e., PENS) and the formulas used to create sentences (i.e., SV, SVV,
SSV, SSVV in which S = subject and V = verb). The participants demonstrated their understanding of the sentence writing strategy by orally stating what each letter of PENS stood for and how each step of PENS was operationalized. Before exiting this stage, each participant needed to explain the meaning of the mnemonic device and sentence formulas with 100% accuracy.

In stage five, Controlled Practice, the participants practiced using various components of the sentence writing strategy. To facilitate this practice the participants completed sentence lesson worksheets with instructional prompts. The worksheets were taken from the Proficiency in the Sentence Writing Strategy Student Lessons: Volume 1 (Sheldon & Schumaker, 1998). The worksheets involved tasks such as identifying the subjects and verbs in pre-written sentences, identifying formulas used to compose sentences, and completing half-started sentences. The difficulty of the worksheets gradually increased. The teacher scored the worksheets and the participants recorded their scores on their progress charts. As scores were recorded, a graphic display was created that described the participants' performance. These progress charts were kept in the participants' notebooks and were available for the researcher to check.

In stage six, Advanced Practice, the instructional prompts and prompt fading characteristics of instructional stage five were not provided. The purpose of this stage was to give the participants opportunities to use the strategy in its entirety. Without being given written cues or writing prompts, participants had to take personal responsibility for initiating use of the strategy (Lenz et al., 2007). This stage was used to administer three intervention probes. The procedure for administering these intervention probes was similar to the ones in the baseline phase. The participants were given the same topic list
used in the baseline phase and asked to choose a topic they could write about for 20 minutes. At the end of the writing session, the researcher counted the number of words written and measured the writing against the predictive quality indicators. The writing probe was also given a percentage score based on the scoring criteria and the sentence score sheet found in The Proficiency in the Sentence Writing Strategy Instructor's Manual (Schumaker & Sheldon, 1999).

Interscorer agreement was calculated by the number of agreements divided by the total number of agreements plus disagreements multiplied by 100. The final percentage represented the level of agreement between the two scorers. The participants' writing probes were scored by the researcher and a para-professional who worked with the researcher at the school and in the classroom where the study took place. She was provided training by the researcher on how to score the writing probes using the criteria described in The Proficiency in the Sentence Writing Strategy Instructor's Manual (Schumaker & Sheldon, 1999).

Additionally, a second teacher observed 25% of the lessons for the purpose of establishing fidelity of lesson implementation. The percentage of instructional steps completed correctly was used to determine fidelity of implementation of the intervention (Cooper, Heron, & Heward, 2007). The formula (number of correct steps divided by the total number of steps completed multiplied by 100 was used.

**Intervention 2: Self-monitoring condition.** The Intervention 2: Self-Monitoring condition took place after school hours in the researcher's classroom. The purpose of this condition was to see how a self-monitoring procedure impacted the participants' quality of writing after having already been taught to use the sentence writing strategy. In this
condition, the researcher first taught the participants how to self-monitor their own writing. Specifically, the participants were each given a blank spiral notebook and a modified sentence-writing checklist (see Appendix E). The researcher described and modeled the self-monitoring procedure. The participants then wrote for 20-minutes about a self-chosen topic. Once their writing time ended, the participants counted the total number of words written and noted the frequency of each of the quality indicators. The participants recorded the word count and frequency of indicators on the modified checklists. The checklists were then stapled to the page in the notebooks where the participants did their writing. The spiral notebooks were available throughout the study for the researcher to check. The participants were reminded to use the sentence writing strategy and to monitor their writing. This phase ended when three data points were collected. It was at the conclusion of this condition that the functional relationship between the independent and dependent variables was evaluated.

The formula used to determine inter-scorer agreement for Intervention 2: Self-Monitoring Procedure was the same as the one used to determine inter-scorer agreement for Intervention 1: Sentence Writing Strategy (the number of agreements divided by the total number of agreements plus disagreements multiplied by 100). The final percentage represented the level of inter-scorer agreement. The participants' writing probes were scored by the researcher and the para-professional who worked with the researcher at the school and in the classroom where the study took place.

The formula used to determine fidelity of implementation for Intervention 2: Self-Monitoring Procedure was the same as the one used to determine fidelity of implementation for Intervention 1: Sentence Writing Strategy (number of correct steps
divided by the total number of steps completed multiplied by 100). A licensed teacher observed 25% of the lessons carried out by the researcher for the purpose of establishing fidelity of lesson implementation.

**Posttest Administration.** The posttests (i.e., Participant Perception of Writing Efficacy survey, Participant Satisfaction survey, TOWE) were administered to the participants during two separate testing sessions immediately following the completion of the self-monitoring intervention. The administration of the posttests was similar to the administration of the pretests. The posttests were given after school in the researcher’s classroom at the participants’ school. In the first session, the participants chose a topic and wrote at least six sentences about it. The participants’ responses were scored according to the criteria described in the Proficiency in Sentence Writing Instructor's Manual (Schumaker & Sheldon, 1999) instructor's manual and using the sentence score sheets. Additionally, the number of words written were counted, as well as the occurrence of each of the quality writing indicators. The responses were scored by two people in order to calculate a percentage of interscorer agreement. The researcher entered the results for each participant into an Excel spreadsheet.

In the second posttest session, the participants were administered the TOWE. The researcher and one other teacher manually scored the participants’ responses and a percentage was calculated that was used to determine interscorer agreement. The session ended with the participants completing the Participant Satisfaction Survey and the Participant Perception of Writing Efficacy Survey. The researcher entered data from this session into an Excel spreadsheet.
**Maintenance condition.** The Maintenance condition took place after school hours in the researcher's classroom. The purpose of this condition was to determine whether students were able to retain their writing performance over time. One week following the completion of the Intervention 2: Self-Monitoring Procedure condition, the first curriculum-based Maintenance probe was administered (i.e., participant selected a topic and was given 20 minutes to write about the selected topic). The second probe was administered one week later (i.e., 2 weeks after instruction had ended). At the end of each Maintenance session, the participants recorded the total number of words written and the frequency of quality indicators on the modified checklist. The checklist was stapled to the page inside the participants’ notebooks with their writing.

Two adults scored 25% of the participants' responses using the sentence score chart from the Proficiency in the Sentence Writing Strategy (Schumaker & Sheldon, 1999). The formula used to determine the reliability level was total number of agreements and disagreements divided by the number of agreements multiplied by 100.

**Phase 3: Data Analysis**

Descriptive data related to the pretests and posttests were compared to assess student performance over time. Additionally, visual analysis of the ongoing curriculum-based probes was conducted to determine the effectiveness of the two interventions (i.e., Sentence Writing Strategy and Self-Monitoring). Gast and Hammond (2010) recommends restricting visual analysis to comparing adjacent conditions (e.g., writing performance between baseline and Intervention 1: Learning Strategy Condition, between Intervention 1: Learning Strategy Condition and Intervention 2: Self-Monitoring Condition, and between Intervention 2: Self-Monitoring Condition and Maintenance
Condition). Descriptive statistics were used to evaluate changes related to the quality indicators for each participant. Finally, an item-by-item frequency response for all participants was calculated for the Participant Satisfaction Survey questions and the Participant Perception of Writing Efficacy survey responses in order to determine level of satisfaction with the interventions (i.e., social validity) and the change in the participants' perception of their own writing after learning the interventions.

**Treatment of Data**

Specific data sets and analyses related to each research question are indicated below.

1. Do middle school students with ASD improve their writing performance after receiving instruction in a sentence writing strategy?

   The ongoing curriculum-based probes were used to answer this question. Specifically, the baseline data (prior to strategy instruction) were compared to the treatment data (after Intervention 1: Sentence Writing Strategy). Descriptive data and visual analysis related to the level, trend, and variability of the data points within both the baseline and first intervention condition took place for all study participants. To further analyze the data obtained, the percentage of non-overlapping data (PND) (i.e., nonparametric approach to determining treatment effects in single subject design studies) was calculated by (a) identifying the highest baseline point among all participants, (b) identifying the number of treatment points from all participants that were greater than the highest baseline point, and (c) dividing the number of treatment points greater than the highest baseline point by the total number of treatment points and multiplying by 100.
Finally, descriptive statistics were used to compare writing quality indicators before and after Intervention 1: Sentence Writing Strategy.

2. Do middle school students with ASD improve their writing performance further when a self-monitoring procedure is added to the sentence-writing strategy? Ongoing curriculum-based probes were used to answer this question. Specifically, the treatment probes (after Intervention 1: Sentence Writing Strategy) were compared to the treatment probes (after Intervention 2: Self-Monitoring). Descriptive data and visual analysis related to the level, trend, and variability of the data points within both treatment conditions took place for all study participants. To further analyze the data, the percentage of non-overlapping data (PND) (i.e., nonparametric approach to determining treatment effects in single subject design studies) was calculated by (a) identifying the highest baseline probe among all participants, (b) identifying the number of treatment probes in the second intervention condition from all participants that were greater than the highest baseline probe, and (c) dividing the number of treatment probes greater than the highest baseline probe by the total number of treatment probes and multiplying by 100. Finally, descriptive statistics were used to compare writing quality indicators demonstrated during Intervention 1: Sentence Writing Strategy and those demonstrated during the Intervention 2: Self-Monitoring.

3. Do middle school students with ASD improve their writing performance after receiving strategy instruction and a self-monitoring procedure? Ongoing curriculum-based probes were used to answer this question. A visual comparison was made between Baseline data and the combined data from
Intervention 1: Sentence Writing Strategy and Intervention 2: Self-Monitoring. Visual analysis related to level, trend, and variability was conducted for each participant. Descriptive statistics were used to compare writing quality indicators before the Combined Intervention data. Additionally, pre- and posttest data from the Proficiency in Sentence Writing Instructor's Manual (Schumaker & Sheldon, 1999) were collected to provide additional descriptive data related to the performance of each participant. Finally, pre- and posttest data from the TOWE were reported to provide standardized test performance data for each participant. Although not required in single-subject research, these pre- and posttest data provided supplemental information related to each of the individual participants.

4. Do middle school students with ASD maintain their writing performance one and two weeks after sentence-writing and self-monitoring instruction has ended?

   Ongoing curriculum-based probes were used to answer this question. Specifically, the treatment probes administered after Intervention 2: Self-Monitoring) were compared to the Maintenance probes. Descriptive data and visual analysis related to the level of the data points within the last treatment condition and the level of the Maintenance data points took place for all study participants.

5. Do middle school students with ASD have positive perceptions about the sentence writing strategy and the self-monitoring intervention?

   Data obtained from the participant satisfaction surveys were used to answer this question. Specifically, a visual comparison was made between the number of responses (i.e., strongly disagree, disagree, agree, strongly agree) for
each survey item to identify the level of participant satisfaction or dissatisfaction
with the interventions.

6. Do the perceptions students with ASD have of their own writing ability change
after learning the sentence writing strategy and the self-monitoring procedure?

Data obtained from the participant's writing efficacy surveys administered
as pre- and posttests were used to answer this question. Specifically, a visual
comparison was made between pre- and posttest responses (i.e. strongly disagree,
disagree, agree, strongly agree) for each item in order to identify the overall level of
change in the participants' perception of their writing efficacy.
Chapter 4

Results

A descriptive and visual analysis of the data is included in this chapter in order to answer the six research questions. The range, mean, and standard deviation are presented and help describe the data from the on-going curriculum-based probes that were administered during the Baseline (BL), Intervention 1: Sentence Writing Strategy (ISW), Intervention 2: Self-Monitoring (ISM), and Maintenance (M) conditions of the study. Additionally, the frequency of responses from the Participant Satisfaction Survey and the Participant Perception of Writing Efficacy Survey is described. Tables and figures are included when appropriate in order to help clarify specific findings.

The purpose of this study was to examine the effects of teaching a sentence writing strategy and a self-monitoring procedure to middle school students with ASD. To address this purpose, six research questions were answered.

1. Do middle school students with ASD improve their writing performance after receiving instruction in a sentence writing strategy?

To answer this question ongoing curriculum-based probes were administered prior to instruction in the sentence writing strategy (i.e., baseline) and during the advanced practice stage (i.e., the final stage) of the sentence writing strategy instruction. These baseline and Intervention 1: Sentence Writing Strategy (ISW) data are displayed in Figures 1 and 2. Visual analysis related to level, trend, and variability was conducted for each participant in the multiple baseline design triad (i.e., Participants 1, 2, and 3) and for each participant in the multiple baseline dyad (i.e., Participants 4 and 5). Additionally,
the percentage of non-overlapping data (PND) was calculated to determine an effect size estimate.

Participant 1 demonstrated a stable baseline with zero-celeration \( (M = 33, SD = 0) \). He required six worksheet trials to achieve mastery in the Controlled Practice Stage of instruction (90\% or higher on the three trials) that allowed him to progress to Intervention 1: Sentence Writing Strategy probe data. Participant 1 demonstrated Intervention 1: Sentence Writing Strategy data that ranged from 25\% to 100\% \( (M = 61.7, SD = 37.5) \). These data represent an increase in level from baseline to Intervention I. With regard to trend, the baseline data were stable with zero-celeration and the Intervention I data were clearly descending. Participant 1 demonstrated no variability in baseline and slight variability in Intervention I performance.

Participant 2 demonstrated baseline data that ranged from 33\% to 83\% \( (M = 61.3, SD = 21.1) \). She required seven worksheet trials to achieve mastery in the Controlled Practice Stage of instruction (90\% or higher on the three trials) that allowed her to progress to Intervention 1: Sentence Writing Strategy probe data. Participant 2 demonstrated Intervention 1: Sentence Writing Strategy data that ranged from 85\% to 100\% \( (M = 95, SD = 8.7) \). These data represent an increase in level from baseline to intervention I. The baseline trend was slightly ascending and the Intervention I trend was descending. Participant 2 demonstrated substantial variability in baseline and slight variability during Intervention I performance.

Participant 3 demonstrated baseline data that ranged from 0\% to 33\% \( (M = 3.3, SD = 10.4) \). He required five worksheet trials to achieve mastery in the Controlled Practice Stage of instruction (90\% or higher on the three trials) that allowed him to
Figure 2. Multiple Baseline Data for Participants Three and Four

progress to Intervention 1: Sentence Writing Strategy probe data. Participant 3 demonstrated Intervention 1: Sentence Writing Strategy data that were identical at 33% across the three trials and thus there is no range to report ($M = 33, SD = 0$). These data represent an increase in level from baseline to the sentence writing intervention. The baseline trend was slightly ascending (based on one data point outlier) and the Intervention 1: Sentence Writing Strategy trend was stable with zero-celeration. Participant 3 demonstrated slight variability in baseline and no variability in Intervention 1: Sentence Writing Strategy performance.

Participant 4 demonstrated baseline data that ranged from 16% to 83% ($M = 62, SD = 31.7$). He required seven worksheet trials to achieve mastery in the Controlled Practice Stage of instruction (90% or higher on the three trials) that allowed him to progress to Intervention 1: Sentence Writing Strategy probe data. Participant 4 demonstrated Intervention 1: Sentence Writing Strategy data that ranged from 83% to 100% ($M = 89.3, SD = 9.3$). These data represent an increase in level from baseline to Intervention 1. The baseline trend was ascending and the Intervention 1: Sentence Writing Strategy trend was slightly ascending. Participant 4 demonstrated variability in both baseline and Intervention 1: Sentence Writing Strategy performance.

Participant 5 demonstrated baseline data that ranged from 42% to 83% ($M = 63.6, SD = 16.6$). He required eight worksheet trials to achieve mastery in the Controlled Practice Stage of instruction (90% or higher on the three trials) that allowed him to progress to Intervention 1: Sentence Writing Strategy probe data. Participant 5 demonstrated Intervention 1: Sentence Writing Strategy data that ranged from 50% to 60% ($M = 60.7, SD = 9.2$). These data represent a decrease in level from baseline to
Intervention 1. The baseline trend was slightly ascending and the Intervention 1 trend was descending. Participant 5 demonstrated substantial variability in baseline and slight variability in Intervention 1 performance.

Although four out of five participants demonstrated an increase in level, it is important to note that three of the five participants demonstrated a decreasing trend during the Intervention 1: Sentence Writing condition. The percentage of non-overlapping data (PND) was calculated in order to determine the effect size of Intervention 1: Sentence Writing condition for each participant. McMillan (2008) reported that 20% to 49% represents a small effect size. Fifty percent to 74% represents a moderate effect size, and anything equal to or greater than 75% represents a large effect size. The effect size for Participant 2 was large, the effect size for Participants 1 and 4 was moderate, and there was zero effect of Intervention 1: Sentence Writing condition for Participants 3 and 5. See Table 2 for individual participant data.

Table 2

<table>
<thead>
<tr>
<th>Participant</th>
<th>Effect Size</th>
<th>Strength of Intervention 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>66.6%</td>
<td>moderate</td>
</tr>
<tr>
<td>2</td>
<td>100%</td>
<td>large</td>
</tr>
<tr>
<td>3</td>
<td>0%</td>
<td>zero effect</td>
</tr>
<tr>
<td>4</td>
<td>66.6%</td>
<td>moderate</td>
</tr>
<tr>
<td>5</td>
<td>0%</td>
<td>zero effect</td>
</tr>
</tbody>
</table>
In addition, descriptive data related to the writing quality indicators demonstrated before and after Intervention 1: Sentence Writing Strategy were examined. Of the five participants, one (i.e., Participant 1) increased the number of words written and the number of long words written. The remaining four participants demonstrated a decrease in the number of words written and the number of long words written. The total number of words in correct sentences increased for Participants 1, 2, 3, and 4, but decreased for Participant 5. See Appendix H for individual participant data.

2. Do middle school students with ASD improve their writing performance further when a self-monitoring procedure is added to the sentence writing strategy?

To answer this question ongoing curriculum-based probes for Intervention 1: Sentence Writing Strategy were compared to ongoing curriculum-based probes for Intervention 2: Self Monitoring. These data are displayed in Figures 1 and 2. Visual analysis related to level, trend, and variability was conducted for each participant in both intervention conditions. Additionally, the percentage of non-overlapping data was calculated to determine an effect size estimate for Intervention 2: Self Monitoring. This was compared to the effect size estimate for Intervention 1: Sentence Writing Strategy.

Participant 1 demonstrated Intervention 1: Sentence Writing Strategy data that ranged from 25% to 100% ($M = 61.7, SD = 37.5$). He demonstrated Intervention 2: Self-Monitoring data that ranged from 75% to 100% ($M = 91.7, SD = 14.4$). These data represent an increase in level from Intervention 1 to Intervention 2. The Intervention 1 data trend was descending and the Intervention 2 trend was ascending. Participant 1 demonstrated slight variability in both Intervention 1 and intervention 2 performance.
Participant 2 demonstrated Intervention 1: Sentence Writing Strategy data that ranged from 85% to 100% ($M = 95$, $SD = 8.7$). She demonstrated Intervention 2: Self-Monitoring data that ranged from 71% to 100% ($M = 83.7$, $SD = 14.8$). These data represent a decrease in level from Intervention 1 to Intervention 2. The Intervention 1 data trend was descending and the Intervention 2 trend was descending. Participant 2 demonstrated slight variability in Intervention 1 and slightly more variability in Intervention 2 performance.

Participant 3 demonstrated Intervention 1: Sentence Writing Strategy data that were stable and had zero-celeration ($M = 33$, $SD = 0$). He demonstrated Intervention 2: Self-Monitoring data that ranged from 14% to 57% ($M = 34.7$, $SD = 21.5$). These data represent a slight increase in level from Intervention 1 to Intervention 2. The Intervention 1 data trend was stable and had zero-celeration and the Intervention 2 trend was ascending. Participant 3 demonstrated no variability in Intervention 1 performance and substantial variability in Intervention 2 performance.

Participant 4 demonstrated Intervention 1: Sentence Writing Strategy data that ranged from 83% to 100% ($M = 89.3$, $SD = 9.3$). He demonstrated Intervention 2: Self-Monitoring data that ranged from 57% to 100% ($M = 80$, $SD = 21.7$). These data represent a decrease in level from Intervention 1 to Intervention 2. The Intervention 1 data trend was slightly ascending and the Intervention 2 trend was ascending. Participant 4 demonstrated variability in Intervention 1 and slight variability in Intervention 2 performance.

Participant 5 demonstrated Intervention 1: Sentence Writing Strategy data that ranged from 50% to 66% ($M = 60.7$, $SD = 9.2$). He demonstrated Intervention 2: Self-
Monitoring data that ranged from 83% to 100% \((M = 94.3, SD = 9.8)\). These data represent an increase in level from Intervention 1 to Intervention 2. The Intervention 1 data trend was descending and the Intervention 2 trend was stable with zero-celeration. Participant 5 demonstrated variability in both Intervention 1 and Intervention 2 performance.

Thus, three of the five participants (i.e., Participants 1, 3, and 5) demonstrated an increase in level between Intervention 1 and Intervention 2. This indicates further improvement in writing performance for these three participants. Similarly, three of the five participants (i.e., Participants 1, 3, and 4) demonstrated an ascending trend during Intervention 2. The percentage of non-overlapping data (PND) was calculated in order to determine the effect size of Intervention 2: Self-Monitoring condition for each participant. The effect size for Participant 1 was large, the effect size for Participant 5 was moderate, and the effect size of Intervention 2: Self-Monitoring condition was small for Participants 2, 3, and 4. See Table 3 for individual participant data.

Table 3

Effect Size of Intervention 2: Self-Monitoring Condition

<table>
<thead>
<tr>
<th>Participant</th>
<th>Effect Size</th>
<th>Strength of Intervention 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>100%</td>
<td>large</td>
</tr>
<tr>
<td>2</td>
<td>33%</td>
<td>small</td>
</tr>
<tr>
<td>3</td>
<td>33%</td>
<td>small</td>
</tr>
<tr>
<td>4</td>
<td>33%</td>
<td>small</td>
</tr>
<tr>
<td>5</td>
<td>66.6%</td>
<td>moderate</td>
</tr>
</tbody>
</table>
In addition, descriptive data related to the writing quality indicators during Intervention 2: Self-Monitoring were determined and compared to the writing quality indicators demonstrated during Intervention 1: Sentence Writing. Of the five participants, four (i.e., Participants 1, 2, 3, and 4) increased the number of words, four (i.e., Participants 2, 3, 4, and 5) increased the number of long words, and four (i.e., Participants 1, 2, 4, and 5) increased the total number of words in correct sentences. See Appendix I for individual participant data for both Intervention 1 and Intervention 2.

3. Do middle school students with ASD improve their writing performance after receiving strategy instruction and a self-monitoring procedure?

To answer this question ongoing curriculum-based probes were administered prior to instruction in the sentence writing strategy and after each of the interventions (i.e., sentence writing and self-monitoring procedure). These baseline and intervention data are displayed in Figures 1 and 2. To answer this research question, data from both interventions were combined. Visual analysis related to level, trend, and variability was conducted for each participant in both the multiple baseline design triad and the multiple baseline dyad. Additionally, the percentage of non-overlapping data was calculated to determine an effect size estimate for both interventions combined. This was compared to the effect size estimate for each intervention (i.e., sentence writing strategy and self-monitoring) alone.

Participant 1 demonstrated baseline data that were stable and had zero-celeration ($M = 33$, $SD = 0$). He demonstrated Combined Intervention data that ranged from 25% to 100% ($M = 77\%, SD = 30.3$). These data represent an increase in level from baseline to the Combined Intervention. The baseline data trend was stable with zero-celeration
and the Combined Intervention data was ascending. Participant 1 demonstrated no variability in baseline and variability in the Combined Intervention performance.

Participant 2 demonstrated baseline data that ranged from 33% to 83% ($M = 61.3, SD = 21.1$). She demonstrated Combined Intervention data that ranged from 71% to 100% ($M = 89%, SD = 12.5%$). These data represent an increase in level from baseline to Combined Intervention. The baseline data trend was slightly ascending and the Combined Intervention trend was descending. Participant 2 demonstrated substantial variability in baseline and also demonstrated variability in intervention performance.

Participant 3 demonstrated baseline data that ranged from 0% to 33% ($M = 3.3, SD = 10.4$). He demonstrated Combined Intervention data that ranged from 14% to 57% ($M = 34%, SD = 13.7%$). These data represent an increase in level from baseline to Combined Intervention. The baseline data trend was slightly ascending and the Combined Intervention trend was ascending. Participant 3 demonstrated minimal variability in baseline and slightly more variability in Combined Intervention performance.

Participant 4 demonstrated baseline data that ranged from 16% to 83% ($M = 62, SD = 31.7$). He demonstrated Combined Intervention data that ranged from 57% to 100% ($M = 85%, SD = 15.8$). These data represent an increase in level from baseline to Combined Intervention. The baseline data trend was ascending and the Combined Intervention trend was ascending. Participant 4 demonstrated variability in both baseline and Combined Intervention performance.

Participant 5 demonstrated baseline data that ranged from 42% to 83% ($M = 63.6, SD = 16.6$). He demonstrated Combined Intervention data that ranged from 50% to
100% ($M = 78\%, SD = 20.3\%)$. These data represent an increase in level from baseline to Combined Intervention. The baseline data trend was slightly ascending and the Combined Intervention trend ascending. Participant 5 demonstrated substantial variability in baseline and also demonstrated variability in Combined Intervention performance.

All five participants demonstrated an increase in level and four participants demonstrated an ascending trend. The percentage of non-overlapping data (PND) was calculated in order to determine the effect size of Combined Intervention: Sentence Writing condition and Self-Monitoring condition for each participant. The effect size for Participant 1 was large, the effect size for Participants 2 and 4 was moderate, and the effect size for Participants 3 and 5 was small. See Table 4 for individual participant data.

In addition, descriptive data related to the writing quality indicators for the Combined Intervention were determined and compared to the writing quality indicators demonstrated during baseline. Of the five participants, one (i.e., Participant 1) increased Table 4

<table>
<thead>
<tr>
<th>Effect Size of Combined Intervention: Sentence Writing and Self-Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant</td>
</tr>
<tr>
<td>-------------</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
</tbody>
</table>
the number of words written, two (i.e., Participants 1 and 4) increased the number of long words written, and all five increased the total number of words in correct sentences. See Appendix J for individual participant data for the Combined Intervention.

Finally, pre- and posttest data from the Proficiency in Sentence Writing Strategy Instructor's Manual (Schumaker & Sheldon, 1999) and the TOWE were compared. Three out of five participants improved from pre- to posttest on the Proficiency in Sentence Writing assessment (see Table 5). Three out of five participants improved from pre- to posttest on the Item Subtest of the TOWE, and two of the five participants improved from pre- to posttest on the Essay Subtest of the TOWE. See Table 6 for individual participant data.

4. Do middle school students with ASD maintain their writing performance one and two weeks after sentence writing and self-monitoring instruction has ended?

To answer this question ongoing curriculum-based probes were administered one week after instruction was completed and again two weeks after instruction was completed. Intervention 2 data and these Maintenance data were compared and are displayed in Figures 1 and 2. Visual analysis related to level and trend was conducted for each participant in both the multiple baseline design triad and the multiple baseline dyad.

Participant 1 demonstrated Intervention 2 data that ranged from 75% to 100% ($M = 91.7$, $SD = 14.4$). He demonstrated Maintenance data that ranged from 66% to 83% ($M = 74.5$, $SD = 12$). These data represent a decrease in level from Intervention 2 to Maintenance. The Intervention 2 data trend was ascending and the Maintenance data trend was ascending.
Table 5

*Pre- and Posttest Data from the Proficiency in Sentence Writing Strategy*

<table>
<thead>
<tr>
<th>Skill</th>
<th>Skill</th>
<th>Skill</th>
<th>Skill</th>
<th>Skill</th>
<th>Skill</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P1 Pre/Post</td>
<td>P2 Pre/Post</td>
<td>P3 Pre/Post</td>
<td>P4 Pre/Post</td>
<td>P5 Pre/Post</td>
</tr>
<tr>
<td>Complete</td>
<td>66% / 83%</td>
<td>66% / 57%</td>
<td>0% / 28%</td>
<td>66% / 100%</td>
<td>83% / 66%</td>
</tr>
</tbody>
</table>

**Sentences**

*Note.* P1 = Participant 1, P2 = Participant 2, P3 = Participant 3, P4 = Participant 4, P5 = Participant 5.

Participant 2 demonstrated Intervention 2 data that ranged from 71% to 100% ($M = 83.7, SD = 14.8$). She demonstrated Maintenance data that ranged from 77% to 87% ($M = 82, SD = 7.1$). These data represent a slight decrease in level from Intervention 2 to Maintenance. The Intervention 2 data trend was descending and the Maintenance data trend was descending.

Participant 3 demonstrated Intervention 2 data that ranged from 14% to 57% ($M = 34.7, SD = 21.5$). He demonstrated Maintenance data that had zero-celeration ($M = 16, SD = 0$). These data represent a decrease in level from Intervention 2 to Maintenance. The Intervention 2 data trend was ascending and the Maintenance data trend showed stability with zero-celeration.

Participant 4 demonstrated Intervention 2 data that ranged from 57% to 100% ($M = 80, SD = 21.7$). He demonstrated Maintenance data that was stable with zero-celeration ($M = 100, SD = 0$). These data represent an increase in level from Intervention 2 to Maintenance. The Intervention 2 data trend was ascending and the Maintenance data trend was stable with zero-celeration.
Table 6

*Pre- and Posttest Data from the TOWE*

<table>
<thead>
<tr>
<th></th>
<th>P1 Pre</th>
<th>P1 Post</th>
<th>P2 Pre</th>
<th>P2 Post</th>
<th>P3 Pre</th>
<th>P3 Post</th>
<th>P4 Pre</th>
<th>P4 Post</th>
<th>P5 Pre</th>
<th>P5 Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>RS 32</td>
<td>43</td>
<td>41</td>
<td>36</td>
<td>55</td>
<td>55</td>
<td>29</td>
<td>35</td>
<td>30</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>SS 86</td>
<td>93</td>
<td>91</td>
<td>84</td>
<td>111</td>
<td>111</td>
<td>78</td>
<td>89</td>
<td>82</td>
<td>89</td>
</tr>
<tr>
<td></td>
<td>GE 3.3</td>
<td>7.3</td>
<td>6.7</td>
<td>4.0</td>
<td>&gt;9.3</td>
<td>&gt;9.3</td>
<td>3.0</td>
<td>3.9</td>
<td>3.3</td>
<td>3.9</td>
</tr>
<tr>
<td>Essay</td>
<td>RS 7</td>
<td>9</td>
<td>4</td>
<td>13</td>
<td>17</td>
<td>13</td>
<td>10</td>
<td>7</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>SS 89</td>
<td>92</td>
<td>80</td>
<td>96</td>
<td>117</td>
<td>112</td>
<td>100</td>
<td>94</td>
<td>96</td>
<td>93</td>
</tr>
<tr>
<td></td>
<td>GE 5.0</td>
<td>6.6</td>
<td>3.0</td>
<td>7.9</td>
<td>&gt;9.0</td>
<td>7.5</td>
<td>7.0</td>
<td>5.0</td>
<td>6.6</td>
<td>6.0</td>
</tr>
</tbody>
</table>

*Note.* RS = raw score, SS = standard score, GE = grade equivalent.

Participant 5 demonstrated Intervention 2 data that ranged from 83% to 100% ($M = 94.3, SD = 9.8$). He demonstrated Maintenance data that ranged from 83% to 100% ($M = 91.5, SD = 12$). These data represent a slight decrease in level from Intervention 2 to Maintenance. The Intervention 2 data trend was stable with zero-aceleration and the Maintenance data trend was descending.

Thus, four out of five participants demonstrated a decrease in level, and three out of five participants demonstrated a stable or ascending trend between the week 1 Maintenance probe and the week 2 Maintenance probe. In addition, descriptive data related to the writing quality indicators for Intervention 2 were determined and compared...
to the writing quality indicators demonstrated during the Maintenance condition. Of the five participants, two (i.e., Participants 2 and 3) increased the number of words written, three (i.e., Participants 1, 2, and 3) increased the number of long words written, and two (i.e., Participants 2 and 3) increased the total number of words in correct sentences. Thus, Participant 1 maintained in one quality indicator (i.e., number of long words). Participants 2 and 3 maintained in all three quality indicators, and Participants 4 and 5 did not maintain performance in any of the three quality indicators. See Appendix K for individual participant data for Intervention 2: Self-Monitoring.

5. Do middle school students with ASD have positive perceptions about the sentence writing strategy and the self-monitoring intervention?

To answer this question a Participant Satisfaction Survey was administered after instruction in Intervention 2 (i.e., self-monitoring procedure) was completed. All five participants (i.e., 100%) agreed or strongly agreed that the sentence writing strategy was easy to use. Additionally, all five participants (i.e., 100%) agreed or strongly agreed that they liked learning the sentence writing strategy. Participants 1, 3, and 4 (i.e., 60% of the total participants) agreed or strongly agreed that the self-monitoring procedure was easy to use while participants 2 and 5 (i.e., 40% of the total participants) disagreed. Participants 1, 2, 3, and 4 (i.e., 80% of the total participants) agreed or strongly agreed that they liked learning the self-monitoring procedure while participant 5 (20% of the total participants) disagreed. All five participants (i.e., 100%) agreed or strongly agreed they would use the sentence writing strategy in the future. Participants 1, 2, 3, and 4 (i.e., 80% of the total participants) agreed or strongly agreed that they would use the self-
monitoring procedure in the future while Participant 5 (i.e., 20% of the total participants) disagreed. See Table 7 for a complete display of the participant's survey responses.

6. Do the perceptions students with ASD have of their own writing ability change after learning the sentence writing strategy and the self-monitoring procedure?

To answer this question the participants were administered the Participants' Perceptions of Writing Efficacy Survey before baseline and again after Intervention 2 (i.e., after learning the sentence writing strategy and the self-monitoring procedure). With regard to item one (i.e., I am confident I can write well), the beliefs of Participants 1, 2, and 5 remained the same prior to and after receiving the writing interventions (i.e., Participant 1 and 5 both indicated agree; Participant 2 indicated strongly agree). The beliefs of Participants 3 and 4 changed in a positive direction from disagree to agree after receiving the writing interventions.

With regard to item two (i.e., I like to write), the beliefs of Participants 1 and 2 changed in a positive direction from disagree to agree. The beliefs of Participants 3 and 4 stayed the same with both indicating agree. The beliefs of Participant 5 changed in a negative direction from agree to disagree.

With regard to item three (i.e., I can write six sentences about one topic), the beliefs of Participants 1, 3, and 4 changed in a positive direction. Participant 1 changed from disagree to agree, while Participants 3 and 4 changed from agree to strongly agree. The beliefs of Participants 2 and 5 stayed the same with both indicating strongly agree.

With regard to item four (i.e., I can write really good sentences), the beliefs of Participant 5 changed in a positive direction. He changed from disagree to agree. The beliefs of Participant 3 changed in a negative direction. He changed from strongly agree to agree.
Table 7

*Participant Satisfaction Survey Results*

<table>
<thead>
<tr>
<th>Items</th>
<th>P1</th>
<th>P2</th>
<th>P3</th>
<th>P4</th>
<th>P5</th>
</tr>
</thead>
<tbody>
<tr>
<td>The sentence writing strategy was easy to use.</td>
<td>A</td>
<td>A</td>
<td>SA</td>
<td>SA</td>
<td>A</td>
</tr>
<tr>
<td>I liked learning the sentence writing strategy.</td>
<td>SA</td>
<td>SA</td>
<td>SA</td>
<td>SA</td>
<td>A</td>
</tr>
<tr>
<td>The self-monitoring procedure is easy to use.</td>
<td>A</td>
<td>D</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>I liked learning the self-monitoring procedure.</td>
<td>A</td>
<td>A</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>I will use the sentence writing strategy in the future.</td>
<td>SA</td>
<td>A</td>
<td>SA</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>I will use the self-monitoring procedure in the future.</td>
<td>A</td>
<td>SA</td>
<td>A</td>
<td>A</td>
<td>D</td>
</tr>
</tbody>
</table>

*Note.* P1 = Participant 1, P2 = Participant 2, P3 = Participant 3, P4 = Participant 4, P5 = Participant 5, SA = strongly agree, A = agree, D = disagree.

The beliefs of Participants 1, 2, and 4 stayed the same with Participants 1 and 4 indicating agree and Participant 2 indicating strongly agree.

With regard to item five (i.e., I feel good when people understand what I write), the beliefs of Participants 2, 3, 4, and 5 stayed the same with Participants 2, 4, and 5 indicating strongly agree and Participant 3 indicating agree. The beliefs of Participant 1 changed in a negative direction from strongly agree to agree. Thus, out of the 11
instances of changed beliefs, 8 or 73% were in a positive direction and 3 or 27% were in a negative direction. See Table 8 for individual participant responses.

Table 8

Survey Results of Participants' Perceptions of Writing Efficacy

<table>
<thead>
<tr>
<th></th>
<th>P1</th>
<th>P2</th>
<th>P3</th>
<th>P4</th>
<th>P5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre/Post</td>
<td>Pre/Post</td>
<td>Pre/Post</td>
<td>Pre/Post</td>
<td>Pre/Post</td>
</tr>
<tr>
<td>I am confident</td>
<td>A / A</td>
<td>SA / SA</td>
<td>D / A</td>
<td>D / A</td>
<td>A / A</td>
</tr>
<tr>
<td>I can write well</td>
<td>D / A</td>
<td>D / A</td>
<td>A / A</td>
<td>A / A</td>
<td>A / D</td>
</tr>
<tr>
<td>I can write at least</td>
<td>D / A</td>
<td>SA / SA</td>
<td>A / SA</td>
<td>A / SA</td>
<td>SA / SA</td>
</tr>
<tr>
<td>six sentences about one topic</td>
<td>D / A</td>
<td>SA / SA</td>
<td>A / SA</td>
<td>A / SA</td>
<td>SA / SA</td>
</tr>
<tr>
<td>I can write really</td>
<td>A / A</td>
<td>SA / SA</td>
<td>SA / A</td>
<td>A / A</td>
<td>D / A</td>
</tr>
<tr>
<td>good sentences</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I feel good when</td>
<td>SA / A</td>
<td>SA / SA</td>
<td>A / A</td>
<td>SA / SA</td>
<td>SA / SA</td>
</tr>
<tr>
<td>people understand</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>what I write</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Note: SA = strongly agree, A = agree, D = disagree
Inter-scorer Agreement and Fidelity of Implementation

The researcher was the primary scorer, and he scored all standardized tests, all learning strategy pre- and posttests, and all on-going probes for baseline, Intervention 1, Intervention 2, and Maintenance. A para-professional and a graduate assistant familiar with scoring standardized tests served as the secondary scorers for the purpose of determining reliability. The para-professional read and scored 100% of the sentence writing strategy pre- and posttests using the criteria in the Proficiency in Sentence Writing Strategy Instructor's Manual (Schumaker & Sheldon, 1999). She also read and scored 25% of the participants' responses from baseline, Intervention 1, Intervention 2, and Maintenance. The graduate assistant read and scored 100% of the standardized pre- and posttests (i.e., TOWE) using the criteria described in the Test of Written Expression Examiner's Manual (McGhee et al., 1995). The formula, agreements ÷ (agreements + disagreements) x 100, was used to calculate inter-scorer agreement. See Appendix L for the levels of agreement.

The same graduate assistant who served as a second scorer also observed 20% of the instructional sessions. There were a total of 61 instructional sessions that were provided in this study (i.e., 56 instructional sessions for Intervention 1 and five for Intervention 2). The graduate assistant used a checklist developed by the researcher (see Appendix M). The percentage of steps completed correctly and the possible number of steps completed correctly were used to determine fidelity of implementation of the interventions (Cooper et al., 2007). The formula (number of correct steps ÷ total number of steps completed × 100) was used. See Table 9.
Summary of Results

A descriptive and visual analysis of the data was included in this chapter in order to answer the six research questions. The data demonstrated that four of the participants increased their performance level from baseline to Intervention 1, and one participant showed a decrease in performance level. Three participants increased their performance level further when instruction moved from Intervention 2, and two showed a performance level decrease. Intervention 1 and Intervention 2 each resulted in a large effect size for 20% of the participants (i.e., one participant) in each condition. Intervention 1 resulted in a moderate effect size for 40% of the participants (i.e., two participants), whereas Intervention 2 resulted in a moderate effect size for 20% of the participants. Intervention 1 resulted in a zero effect for 40% of the participants, whereas Intervention 2 resulted in a small effect size for 60% of the participants (i.e., three participants). The result was a large effect size for 20% of the participants, a moderate effect size for 40% of the participants, and a small effect size for 40% of the participants with the Combined Intervention. Additionally, five participants increased writing performance level from baseline to intervention when Intervention 1: Sentence Writing Strategy and Intervention 2: Self-Monitoring were combined to form a treatment package. Both ascending and descending trend levels emerged during the intervention conditions. Only one participant maintained his intervention performance level one and two weeks after instruction ceased. At the end of the study, most of the participants had a positive attitude about the sentence writing strategy and the self-monitoring procedure, and most said they would use both in the future. Also, most of the participants had positive feelings about writing and their own writing ability.
Table 9

*Fidelity of Implementation - Intervention 1: Sentence Writing Strategy and Intervention 2: Self-Monitoring*

<table>
<thead>
<tr>
<th>Number of Correct Steps</th>
<th>Total Number of Steps</th>
<th>Fidelity of Percentage Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>152</td>
<td>152</td>
<td>100%</td>
</tr>
</tbody>
</table>
Chapter 5

Discussion

The passage of NCLB (2001) has prompted schools to give more attention to students' writing performance. Consequently, student writing is becoming more prominent in elementary and secondary school classrooms (Chalk Hagan-Burke & Burke, 2005). Students are expected to reach proficiency standards in their writing performance in order to receive a standard diploma when graduating from high school. Students with special needs (e.g., students with ASD) are being held to similar academic standards as their same-age peers without disabilities. Effective writing instruction for students with ASD is an area in which little evidence-based research exists (Delano, 2007a). The purpose of this study was to examine the effects of teaching a sentence writing strategy and a self-monitoring procedure to middle school students with ASD. This chapter includes a description of the findings from the study as they relate to each research question. The conclusions drawn from these findings are shared. Limitations related to the study are discussed. In addition, practical implications derived from the study are described and recommendations for future research are given.

1. Do middle school students with ASD improve their writing performance after receiving instruction in a sentence writing strategy?

Participants 1, 2, 3, and 4 demonstrated an increase in performance level from baseline to intervention I. This finding concurs with earlier research findings that indicated students' performance levels improved when the Proficiency in Sentence Writing Strategy is taught according to the specifications included in the instructor's manual and when the strategy instruction is implemented with fidelity (Schumaker &
Participant 5, however, showed a decrease in his performance level from baseline to Intervention 1. The decrease in level for Participant 5 may have been due to his dislike of writing. Participant 5 was the only participant who disagreed with the statement "I like to write" on the Participant Perception of Writing Efficacy Survey. When students dislike particular academic activities, it is not uncommon for their performance to suffer.

Baseline trends were slightly ascending for Participants 2, 3, 4, and 5 but it is important to note that Participant 3 had only one outlier baseline data point above zero. Participant 4 also had an ascending baseline due to the first data point (an outlier and very low). It is possible that the outlier for Participant 4 during baseline was due to it being the first session and not feeling comfortable with new people and the new task. It was also the first day back after being away from school for one week for spring break.

Participant 3 demonstrated a trend with zero-eleration at Intervention 1, and Participant 4 demonstrated an ascending trend at Intervention 1. Participants 1, 2, and 5 demonstrated a descending trend at Intervention 1. Participant 1 experienced personal issues that may have impacted his overall performance at Intervention 1. He spoke to the researcher and the graduate assistant about conflicts he was having with his peers. It is also possible that probe weariness contributed to the descending trends of Participants 1, 2, and 5. Participants 1 and 5 were attending the instructional sessions after their regular school day ended, and Participant 2 was attending instructional sessions at the very end of the school day. It is quite possible that the motivation of Participants 1 and 5 to do their best writing was declining because the sessions did not take place during the regular school day and may have been perceived as somewhat unfair because they had to work
longer than their peers. Participant 2 may have had decreased motivation because the school day was almost over and she was tired of writing. None of the participants verbalized these perceptions, but it is possible that they were silently feeling that way. It is also important to note that although the current study demonstrated varying effect sizes for Intervention 1, as they related to individual participants, it did demonstrate positive results related to performance level changes with more than one replication. These mixed results may represent increased knowledge, but decreased performance motivation for at least four of the participants.

With regard to the indicators of writing quality, Participants 1, 2, 3, and 4 showed an increase in the number of words used in correct sentences from baseline to Intervention 1. This improvement makes sense because one of the primary goals of the Sentence Writing Strategy is to ensure that students learn to write different types of correct sentences. Participant 5 showed a decrease in the number of words used in correct sentences. Again, his performance may be linked to his stated dislike of writing. Participant 1 showed an increase in the total number of words used in his writing from baseline to Intervention 1, while Participants 2, 3, 4, and 5 showed a decrease in the total number of words used. Again, this makes sense because there was no emphasis on increasing the number of words used during the Sentence Writing Instruction. It is not uncommon for students with ASD to require explicit instructions in order to perform particular academic tasks. Additionally, it is possible that the participants were using their cognitive energy to remember the sentence writing steps and the formulas they had just learned for writing a variety of correct sentences. This additional thinking time may have prevented the participants from increasing the lengths of their writing samples.
Overall, the majority of the participants showed an immediate and positive change in their performance levels, but the level of improved performance was not sustained for four of the five participants during the Intervention 1 condition.

2. Do middle school students with ASD improve their writing performance further when a self-monitoring procedure is added to the sentence writing strategy?

Participants 1, 3, and 5 showed an increase in performance level from Intervention 1 to Intervention 2, and Participants 2 and 4 demonstrated a decrease in performance level. The results demonstrated by the participants demonstrate that a self-monitoring procedure may be an effective intervention for improving the writing performance of middle school students with ASD. The positive findings for Participants 1, 3, and 5 concur with Holifield et al. (2010) who reached a similar conclusion, but they used elementary school age children with autism in their study. They found that self-monitoring helped students with autism attend to task and increase academic accuracy (Holifield et al., 2010).

The performance level of Participant 2 may have resulted in a decrease in level from Intervention 1 to Intervention 2 and a descending trend in Intervention 1 and in Intervention 2 because she received the interventions one hour before the other participants, while other students were in the room who were not part of the study. The noise level in the classroom was higher and there was more activity. There were more opportunities for her to be distracted. This may account, as well, for the variability she showed in her performance within and between phases. The decline in level of performance for Participant 2 and 4 may have been an indication that learning the self-
monitoring procedure so soon after the strategy instruction presented a heavy cognitive load for these two participants. Perhaps they needed more time working with the Sentence Writing Strategy before beginning another new procedure.

With regard to the indicators for writing quality, Participants 1, 2, 4, and 5 showed an increase in the total number of words used in correct sentences, Participants 1, 2, 3, and 4 showed an increase in the total number of words used, and Participants 2, 3, 4, and 5 showed an increase in the number of long words used. The overall increase in these quality indicators from Intervention 1 to Intervention 2 are possibly reflective of the participants receiving explicit instruction related to using self-monitoring on these three quality indicators. This additional instruction may have allowed the participants to see that in addition to using the Sentence Writing Strategy, it was also important to lengthen their writing probes. Without knowing the precise carryover effect that learning the sentence writing strategy had on learning the self-monitoring procedure, the results from the current study may align with Schumaker and Sheldon's (1999) findings that students who have learned the sentence writing strategy produce written products that have more words. In other words, it is possible that the additional practice time using the Sentence Writing Strategy influenced the increase in words written. It is also possible that it was the combination of the two interventions that resulted in the increase in probe length.

Finally, it is important to note that not all participants showed an increase in each of the writing quality indicators. Participant 3 demonstrated a decrease in total words used in a correct sentence, Participant 1 demonstrated a decrease in long words used, and Participant 5 demonstrated a decrease in total number of words used. Plausible
explanations for this are less obvious than previously offered possibilities. This may just have to do with the heterogeneity among students with autism.

3. Do middle school students with ASD improve their writing performance after receiving strategy instruction and a self-monitoring procedure?

Combining the sentence writing strategy with the self-monitoring procedure may be an effective practice. All five participants responded positively to the combined effects of the sentence writing strategy and the self-monitoring procedure. All five participants demonstrated an increase in level from baseline to the Combined Intervention. These findings concur with those of Schumaker and Sheldon (1999) who noted that student performance levels increased when strategies are used to supplement other strategies students have already learned. This was apparent when the self-monitoring procedure was used to supplement the sentence writing strategy. It is also important to note that Participants 1, 3, 4, and 5 demonstrated an ascending trend in the Combined Intervention, while Participant 2 showed a descending trend. Again, the additional distraction from receiving instruction during the last hour of the school day may have had a negative effect on Participant 2.

In addition, the varying effect sizes among the participants reflect the findings of current research regarding the executive function of students with autism. Researchers have determined that self-monitoring is an aspect of executive function (Liss et al., 2001; Verte et al., 2006). They have also determined that people with autism have an impaired executive function (Liss et al., 2001). The varying performance levels and trends among the participants in this study support earlier research that indicates executive functioning deficits may be present in subsets of people with autism and that different executive
function profiles exist within groups of people on the autism spectrum (Hill & Bird, 2006; Landa et al., 2005; Liss et al., 2001; Verte et al., 2006). This may explain why some participants responded differently than others in different phases of the current study.

With regard to the indicators for writing quality, all five participants demonstrated an increase in the total number of words used in correct sentences from baseline to Combined Intervention. Participant 1 demonstrated an increase in the total number of words used and Participants 2, 3, 4, and 5 demonstrated a decrease in the total number of words used from baseline to Combined Intervention. The total number of long words (i.e., seven letters or more) increased from baseline to Combined Intervention for Participants 1, 4, and 5. Participants were approaching the end of the study when they began the Combined Intervention. It is possible that they suffered from probe weariness. It should also be noted that researchers have demonstrated through earlier studies that students with ASD used a minimal number of words during writing activities (Pennington, 2009). These factors may account for the decrease in the amount Participants 2, 3, 4, and 5 wrote in Combined Intervention.

4. Do middle school students with ASD maintain their writing performance one and two weeks after sentence writing and self-monitoring instruction has ended?

The performance levels of the participants indicate that the effects of the sentence writing strategy and the self-monitoring procedure may be limited in terms of Maintenance. Participant 4 showed an increase in his performance level from intervention II to Maintenance. Participants 1, 2, 3, and 5 showed a decrease in performance. Participant 1 displayed a Maintenance trend that was ascending.
Participants 2 and 5 demonstrated a performance trend at Maintenance that was descending. Participant 3 and 4 demonstrated a stable trend with zero-celeration at Maintenance. Earlier studies that examined the effects of self-monitoring on the performance of students with disabilities (i.e., autism) did not include a Maintenance phase (Odom & Watts, 1991; Ganz & Sigafoos, 2005; Holifield et al., 2010). Odom & Watts (1991) concluded that the participants in their study would not have demonstrated Maintenance of skills had they included a Maintenance phase in their study. Self-monitoring may possibly be a behavior that requires extensive instruction on the part of the teacher before it becomes a learned behavior.

With regard to the indicators for writing quality, Participants 2 and 3 demonstrated an increase in the total number of words used in correct sentences from Intervention 2 to Maintenance. Participants 1, 4, and 5 demonstrated a decrease. Participants 2 and 3 showed an increase in the total number of words from Intervention 2 to Maintenance, while Participants 1, 4, and 5 showed a decrease. Participants 1, 2, and 3 demonstrated an increase in the number of long words used from Intervention 2 to Maintenance. Participants 4 and 5 showed a decrease in the number of long words used.

It is important to describe two factors that may have influenced the participants' motivation and thus, their performance. First, the participants were not prompted or provided a verbal or visual cue other than being told the purpose for the writing session. The researcher told the participants that they should write with the purpose of demonstrating what they learned from the sentence writing strategy instruction and what they had learned about checking their writing. They were not given the sentence-writing checklist during the Maintenance condition. Thus, they had to depend on their memory.
Consequently, the confidence they had in their own ability to perform well may have been low. This aligns with the results Zimmerman et al. (1992) demonstrated with their earlier study. They found that students' academic self-motivation is influenced by their self-beliefs of efficacy to strategically regulate learning (Zimmerman et al., 1992).

Second, the Maintenance phase coincided with the last weeks of school. Some participants (i.e., Participants 2 and 5) completed Maintenance the last full week of school. This may have had a negative effect on their level of motivation. Thus, the participants' overall performance levels may have been affected.

5. Do middle school students with ASD have positive perceptions about the sentence writing strategy and the self-monitoring intervention?

The participants' responses from the Participant Satisfaction Survey show that more of the participants would use the sentence writing strategy in the future than the self-monitoring procedure. The different amount and different level of intensity of instruction between the sentence writing strategy and the self-monitoring procedure may have influenced the participants' responses. The participants were provided multiple sessions to learn the sentence writing strategy and to practice using it while receiving corrective feedback from the researcher. The participants, however, were given only one session to learn the self-monitoring procedure. Consequently, the participants may have felt a higher level of confidence with the sentence writing strategy than with the self-monitoring procedure.

In addition, the cognitive nature of students with ASD may have influenced the participants' responses on the Participant Satisfaction Survey. Students with ASD typically need help organizing their thoughts (Griswold et al., 2002). The participants in
the current study learned a mnemonic (i.e., PENS) as part of the sentence writing strategy that was used to organize their words and ideas into four different kinds of simple sentences. Thus, the sentence writing strategy may complement the cognitive nature of students with ASD more than the self-monitoring procedure. The participants may have felt more comfortable using the sentence writing strategy.

6. Do the perceptions students with ASD have of their own writing ability change after learning the sentence writing strategy and the self-monitoring procedure?

The participants' responses from the Participants' Perceptions of Writing Efficacy Survey demonstrate slight positive changes to the perceptions participants had of their writing ability after learning the sentence writing strategy and the self-monitoring procedure. Participants 3 and 4 displayed a positive change in their confidence related to their abilities to write well, whereas Participants 1 and 5 did not display a perceived change in confidence, nor did Participant 2 who had the greatest amount of confidence possible at both pre- and posttest. Thus, there may have been a ceiling effect for Participant 2 based on the upper limit of the Likert scale. The positive change for Participants 3 and 4 is particularly noteworthy because prior to the writing interventions, these two participants disagreed with the statement, "I am confident I can write well," and after learning the interventions they agreed with the statement.

Participants 1, 3, and 4 displayed a positive change related to their ability to write at least six sentences about one topic. There was no change for Participants 2 and 5. This lack of change may again have been a result of a ceiling effect related to the Likert scale because both Participant 2 and 5 rated their perceived abilities as the highest possible score at both pre-and posttest. The positive change for Participant 1 is
particularly noteworthy because prior to the writing interventions, he disagreed with the statement, "I can write at least six sentences about one topic," and after receiving the writing interventions he agreed with the statement.

Participant 5 displayed a positive change related to his ability to write "really good sentences." This is noteworthy because he disagreed with the statement "I can write really good sentences" prior to receiving the writing interventions and then agreed with the statement after receiving the interventions. Participant 3 also displayed a change (a negative one) related to his ability to write "really good sentences." Before receiving the interventions, he strongly agreed and after receiving the interventions, he agreed.

Perhaps the challenge involved in learning the Sentence Writing Strategy and the Self-Monitoring procedure caused Participant 3 to view his abilities a little more realistically, or perhaps the challenge of learning something new made him realize there is room for improvement whenever writing takes place.

It is also important to note that Participant 3 was taught a more difficult sentence writing strategy than the other participants. He was taught the sentence writing strategy for writing compound sentences, whereas the other participants were taught the sentence writing strategy for writing simple sentences. Thus, Participant 3 had to learn extra steps and a mnemonic (i.e., FAN BOYS) in addition to PENS. Consequently, Participant 3 had to monitor his writing for simple sentences that reflected all aspects of the simple sentence writing strategy as well as monitor his writing for compound sentences that reflected all aspects of the compound sentence writing strategy. Unlike the other participants, Participant 3 may have felt the risk of making more errors in his writing.
thus causing a change in his perceptions (i.e., strongly agree to agree) about his own writing abilities.

The remaining two questions on the Participants' Perceptions of Writing Efficacy had more to do with liking to write and positive feelings about others being able to understand their writing than their personal self-efficacy related to writing. The statement, "I like to write," had the most total responses on the negative end of the Likert scale of all the items on the survey (i.e. disagree was mentioned twice at pretest and once at posttest). Clearly, some students with autism do not enjoy the writing process. Writing is a complex process and difficult for many students with disabilities (Deatline-Buchman & Jitendra, 2006). Thus, this finding was not particularly surprising. At least two of the negative ratings changed to positive ratings (i.e., agree) after learning the Sentence Writing Strategy and Self-Monitoring procedure. This is important because students are more likely to perform well if they like the task. Interestingly, the highest rated response on the survey was "I feel good when people understand what I write." Thus, students with autism want to be understood and perhaps this also indicates that they want to write well even though they do not enjoy the writing process.

The positive changes in the Participants' responses may have been influenced by the corrective feedback the participants received related to their performance throughout the course of the study. According to Schumaker and Sheldon (1999), corrective feedback should be specific, and the more specific it is, the more a student's performance improves. The purpose of the feedback was to inform students of their improvement as they progressed through the study. It is also possible that the individual attention provided to each participant helped increase their writing confidence. Participant 1
commented several times during the study that he liked staying after school because it was quiet, and there were not a lot of people. Almost all of Participant 2’s responses indicated no change in her perceptions of her writing ability. Her responses on the survey before learning the sentence writing strategy and the self-monitoring procedure were almost all "strongly agree." One reason for this may be that Participant 2 seems to possess more self-confidence than the other participants in the study. Thus, self-confidence involves both academic tasks and future career aspirations. She said her career ambition was to be an actress, which may indicate confidence in terms of performing in front of an audience: something most people fear. Research findings also indicate that self-appraisal of personal capabilities and efficacy beliefs influence a person's career aspirations (Bandura et al., 1996).

**Conclusions**

Several conclusions may be drawn from this research. First, the Proficiency in Sentence Writing Strategy may be an effective method for increasing the writing performance level of some, but not all middle school students with ASD. Second, the self-monitoring procedure may be an effective complement to the sentence writing strategy. Third, the effect size of combining the Sentence Writing Strategy with Self-Monitoring procedures for the individual participants varied between a small effect size and a large effect size. Fourth, additional supports are needed for students with ASD to maintain writing skills at intervention levels. Fifth, survey responses indicate that the sentence writing strategy and the self-monitoring procedure are socially valid and help improve participant satisfaction with their own writing skills.
Limitations

The results of this study must be considered in terms of a few limitations. First, the results were obtained with instruction being provided at the very end of the day (i.e., Participant 2) and after the regular school day. Thus, the results may be different than if instruction was provided earlier in the school day. Second, the amount of time for the post instruction probes was determined based on when the school year was going to end instead of using performance data as the criteria for beginning the next study condition.

Practical Implications

There are several practical implications that can be drawn from the results of the current study. These implications directly relate to the interests and concerns of anyone who is engaged in teaching students with ASD to become better writers.

1. Strategy instruction may be an effective way to improve the writing skills of some students with ASD. Thus, teachers who teach writing to middle school students with ASD may benefit from training in different writing strategies within the University of Kansas Learning Strategy Curriculum (i.e., Proficiency in Sentence Writing and Paragraph Writing Strategy).

2. It may be important to consider the cognitive capacity of students before instructing them in more than one strategy within a limited amount of time. Some students may be able to learn the sentence writing strategy but may benefit from more time than given in the current study to demonstrate proficiency and reach a comfort level with the strategy before they progress to adding the self-monitoring procedure.
3. It may be more beneficial to provide the writing instruction during the school day rather than having students stay after school. It also may be more beneficial to teach the Sentence Writing Strategy earlier in the school year and then provide subsequent opportunities to use the strategy throughout the school year. This has the potential to improve skill Maintenance.

4. Writing is a subjective and personal experience. Consequently, students’ level of development in writing may need to be considered in relation to individual students' affect and attitude toward writing. Teaching students with ASD the sentence writing strategy and the self-monitoring procedure may work to improve their writing performance without improving how much they like to write.

Suggestions for Further Research

Results from the current study indicate a need for further research in the areas of strategy instruction and self-monitoring for middle school students with ASD. It would be interesting to compare the results of the current study to a replication of the study but with the instruction provided during the school day instead of after school. It would also be interesting to replicate the study earlier in the school year and extend the intervention probe conditions.

It may be worthwhile to examine ways to combine English as a Second Language (ESL) teaching strategies with the sentence writing strategy. One participant (i.e., Participant 5) in the current study was designated an English Language Learner by the school district. It was not clear how his level of English language development impacted his level of writing performance with the sentence writing strategy and the self-monitoring procedure. It is important to note, however, that Participant 5 was the only
participant to express his dislike for writing. He also demonstrated the least performance growth overall.

Another area that may warrant further research is examination of how self-monitoring affects the behavior of middle schools students' who have ASD. Earlier studies have shown that self-monitoring increases on task-behavior for students who have learning disabilities and behavioral disorders (Holifield et al., 2010). Participant 4 was easily distracted and frequently looked for ways to distract the researcher. Participant 4, however, showed overall growth in his writing performance and was satisfied with the sentence writing strategy, the self-monitoring procedure, and his own writing ability.

The current study examined how middle school students’ writing performance was affected after being taught the sentence writing strategy and the self-monitoring procedure in a small group setting after regular school hours. It may be worth examining how effective both interventions are when taught to middle school students with ASD in their general education classrooms.

Finally, the participants were taught how to self-monitor their writing performance and check for three indicators of writing quality (i.e., total words written, long words, total words used in complete sentences). A smaller percentage of participants said they would use the self-monitoring procedure in the future than said would use the sentence writing strategy. It may be worthwhile to examine if it was the act of having to go back and check work the participants may already have felt was complete, or if it was the specifics (i.e., total words written, long words, total words used in complete sentences) of what they needed to check for that influenced their responses.
Appendix A

Topic List

1. My Favorite Meal
2. Summer Activities
3. The Best Things About School
4. Life as a Teenager
5. The Best Place to Live
6. My Favorite Sport
7. The Best Job in the World
8. My New Year's Resolution

Appendix B
Survey of Participants' Perceptions of Writing Efficacy

1. I am confident that I can write well.
   
   ![Likert Scale]
   
   strongly disagree agree strongly disagree agree

2. I like to write.
   
   ![Likert Scale]
   
   strongly disagree agree strongly disagree agree

3. I can write at least six complete sentences about one topic.
   
   ![Likert Scale]
   
   strongly disagree agree strongly disagree agree

4. I can write really good sentences.
   
   ![Likert Scale]
   
   strongly disagree agree strongly disagree agree
5. I feel good when people understand what I write.

strongly disagree    agree    strongly disagree    agree
Appendix C
Participant Satisfaction Survey

1. The sentence writing strategy is easy to use.
   - strongly disagree agree strongly disagree agree

2. I liked learning the sentence writing strategy.
   - strongly disagree agree strongly disagree agree

3. The self-monitoring procedure is easy to use.
   - strongly disagree agree strongly disagree agree

4. I liked learning the self-monitoring procedure.
   - strongly disagree agree strongly disagree agree
5. I will use the sentence writing strategy in the future.

6. I will use the self-monitoring procedure in the future.
Appendix D

Topic List for Curriculum Based Probes

1. My Favorite Meal
2. Summer Activities
3. The Best Things About School
4. Life as a Teenager
5. The Best to Live
6. My Favorite Sport
7. The Best Job in the World
8. My New Year's Resolution

Appendix E

Name: __________________________ Date: ______________________

Simple Sentence Checklist

S  V  _____
SS V  _____
S VV  _____
SS VV  _____

Number of words  ______
Number of long words (words with 8 or more letters)  ______
Number of words in complete sentences  ______

Name: __________________________ Date: ______________________

Compound Sentence Checklist

S  V  _____
SS V  _____
S VV  _____
SS VV  _____

I, c I  _____
I : I  _____

Number of words  ______
Number of long words (words with 8 or more letters)  ______
Number of words in complete sentences  ______
Appendix F

Indicators for Writing Quality

<table>
<thead>
<tr>
<th>Predictors for Writing Quality</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Words Written</td>
<td>Including words spelled incorrectly</td>
</tr>
</tbody>
</table>
| Parts of Speech               | Nouns - person, place, thing, quality or idea (Schumaker, J. B. & Sheldon, J. B., 2006)  
Verbs - word that shows the action or state of being (Schumaker, J. B. & Sheldon, J. B., 2006)  
Adjective - |
| Long Words                    | Words spelled correctly with 8 or more letters |
| Words spelled correctly        | This includes words spelled correctly in isolation |
| Total number of punctuation marks | Include those incorrectly used |
| Correct punctuation marks     | Punctuation marks correctly used or in the correct location of the sentence |
| Correct capitalization        | Correct use of capital letters, such as at the beginning of sentences and in the middle of a sentence (proper nouns) |
| Complete sentences            | Starts with a capital letter  
Identifiable subject (see definition of noun above)  
Identifiable verb (see definition of verb above)  
Ending punctuation |
| Number of words in a complete sentence | Count the total words in all sentences previously counted as complete sentences |
| Number of words in correct sequence | The joining of two words spelled correctly and grammatically correct |
| Number of sentence fragments  | An incomplete sentence, not an independent clause (see definition below) |
| Number of simple sentences    | A simple sentence is a sentence with one independent clause (Schumaker, J. B. & Sheldon, J. B., 2006)  
An independent clause is a group of words that make a complete statement and has a subject and a verb (Schumaker, J. B. & Sheldon, J. B., 2006) |

Appendix G

Summary of Reliability Studies of Curriculum-Based Written Expression Measures

<table>
<thead>
<tr>
<th>Study</th>
<th>Type of reliability</th>
<th>Total words</th>
<th>Words correct</th>
<th>Correct letter sequence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marston, 1982</td>
<td>Test-retest (10 weeks) 10 parallel forms, 1 week apart</td>
<td>.42</td>
<td>.46 (mean)</td>
<td>.51 (mean)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.58 (mean)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marston &amp; Deno, 1981</td>
<td>Test-retest (1 day) Test-retest (3 weeks)</td>
<td>.91</td>
<td>.81 (mean)</td>
<td>.92 (mean)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.64 (mean)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marston &amp; Deno, 1981</td>
<td>2 parallel forms, same day</td>
<td>.95</td>
<td>.95 (median)</td>
<td>.96 (median)</td>
</tr>
<tr>
<td>Shinn, 1981</td>
<td>Test-retest (5 weeks) 4 parallel forms, 1 week apart</td>
<td>.69</td>
<td>.73 (median)</td>
<td>.71 (median)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.59 (median)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tindal, Germann, et al., 1983</td>
<td>Test-retest (2 weeks)</td>
<td>.56</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Tindal, Germann, et al., 1983</td>
<td>2 parallel forms at the same time</td>
<td>.70</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Tindal, Marston, et al., 1983</td>
<td>Test-retest (6 months) 2 sets of 2 parallel forms at the same time</td>
<td>.70</td>
<td>-</td>
<td>.86 (mean)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.73 (mean)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Appendix H

**Quality Indicator Data Before and After Intervention 1: Sentence Writing Strategy**

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*Note.* B = baseline, SW = sentence writing, TWCS = total words in correct sentences
Appendix H (continued)

Quality Indicator Data Before and After Intervention 1: Sentence Writing Strategy

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*Note.* B = baseline, SW = sentence writing, TWCS = total words in correct sentences.
Appendix I

Quality Indicator Data for Intervention 1 and Intervention 2

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*Note.* SW = sentence writing, SM = self-monitoring, TWCS = total words in correct sentences.
Appendix I (continued)

Quality Indicator Data for Intervention 1 and Intervention 2

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Note. SW = sentence writing, SM = self-monitoring, TWCS = total words in correct sentences.
Appendix J

Quality Indicator Data From Baseline and Combined Intervention

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*Note.* B = baseline, CI = Combined Intervention, TWCS = total words in correct sentences.
Appendix J (continued)

Quality Indicator Data From Baseline and Combined Intervention

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*Note.* B = baseline, CI = Combined Intervention, TWCS = total words in correct sentences.
## Appendix K

Quality Indicator Data From Intervention 2: Self-Monitoring and Maintenance

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*Note.* SM = self-monitoring, M = Maintenance, TWCS = total words in correct sentences.

151
### Appendix K (continued)

#### Quality Indicator Data From Intervention 2: Self-Monitoring and Maintenance

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*Note.* SM = self-monitoring, M = Maintenance, TWCS = total words in correct sentences.
Appendix L

Inter-scorer Agreement

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<th>Percentage of Agreement</th>
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*Note.* TOWE = Test of Written English, QI = quality indicators, SW = sentence writing.
Appendix L (continued)

Inter-scorer Agreement

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Note. TOWE = Test of Written English, QI = quality indicators, SW = sentence writing.
Appendix M

A Checklist to Determine Fidelity of Implementation

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Session: _________________________________________________

Intervention: _____________________________________________

Participant: ______________________________________________

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<th>No</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>The teacher stated the objective for the lesson.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>The teacher provided the participants with an advance organizer.</td>
<td></td>
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<tr>
<td>3.</td>
<td>The teacher demonstrated and modeled the activity.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>The teacher provided the participants with an opportunity for guided practice.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>The teacher provided the participants with an opportunity for independent practice.</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>The teacher provided closure to the lesson.</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>The teacher provided the students positive feedback.</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>The teacher provided the students corrective feedback.</td>
<td></td>
</tr>
</tbody>
</table>

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<tr>
<th>Total</th>
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</thead>
</table>


Courtade, G., Spooner, F., Browder, D., & Jimenez, B. (2012). Seven reasons to promote standards-based instruction for students with severe disabilities: A reply


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EDUCATION

2001 Master of Arts - Special Education
Point Loma Nazarene University, San Diego, California

1989 Bachelor of Arts - European History
University of California, San Diego, La Jolla, California

PROFESSIONAL CERTIFICATIONS

General Special Education K-12, State of Nevada
Certificate of Eligibility Administrative Services Credential, California
Clear Cross-cultural, Language and Academic Development Certificate, California
Professional Clear Multiple Subject K-12, State of California
Professional Clear Specialist Instruction in Special Education K-12, State of California

SCHOLARLY ACTIVITIES

Presentations


Biennial International Conference on Children and Youth with Behavioral Disorders, Denver, Colorado.

Rago, D. J. (2007, October). *Assessment practices*. In-service for new teachers presented at the South County BTSA Colloquium, San Diego, California.

**Dissertation**


**Publications**


**HONORS AND AWARDS**

2011 - present Golden Key Honor Society

2002 - 2003 Teacher of the Year - San Ysidro Middle School

**PROFESSIONAL ORGANIZATION MEMBERSHIPS**

Council for Exceptional Children

- Division of Autism and Developmental Disabilities
- Division for Exceptional Learning Disabilities