

USING A MOBILE-BASED GRAPHIC ORGANIZER WITH EMBEDDED
PROCEDURAL FACILITATION FOR IDEA GENERATION TO SUPPORT
PERSUASIVE ESSAY WRITING FOR MIDDLE SCHOOL STUDENTS WITH
EMOTIONAL AND BEHAVIORAL DISORDERS

by

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Dedication

This is dedicated to my family: My parents Tae and Mee, my sister Ji, and my brother Jaeim. I am so grateful and humbled that God has given me a family that always provides me with unwavering support, constant laughter and celebration, and unconditional love. 사랑해!

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And it is my prayer that your love may abound more and more, with knowledge and all discernment, so that you may approve what is excellent, and so be pure and blameless for the day of Christ, filled with the fruit of righteousness that comes through Jesus Christ, to the glory and praise of God.

Philippians 1:9-11

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Abstract

USING A MOBILE-BASED GRAPHIC ORGANIZER WITH EMBEDDED PROCEDURAL FACILITATION FOR IDEA GENERATION TO SUPPORT PERSUASIVE ESSAY WRITING FOR MIDDLE SCHOOL STUDENTS WITH EMOTIONAL AND BEHAVIORAL DISORDERS

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This study used a single-subject, multiple-baseline across participants design to replicate previous research on the functional relation between the use of a mobile-based graphic organizer (MBGO) and the persuasive writing performance of middle school students with high incidence disabilities. The current study extended the previous research by adding embedded procedural facilitation cues to generate ideas. Participants for the study were four seventh and eighth-grade students with emotional and behavioral disorders at a public day school. The students first completed essays in the baseline phase, then entered the intervention phase. The four lessons in the instruction phase covered the parts of the persuasive essay and how they relate to each other, the use of the procedural facilitation cues to generate ideas to support opinions, and modeling and independent practice of the MBGO. In the subsequent treatment phase students

completed treatment essays using the MBGO and the strategies learned from the previous phase. After the treatment phase, the students were given a fifth lesson on how to apply the strategies when writing without the MBGO. They then completed maintenance essays. The results from the essays demonstrated improvements from baseline to treatment across all participants in all measures: number of words, number of sentences, number of transition words, functional essay elements, coherence, and holistic writing quality. These improvements were indicated by high-level change and a high percentage of non-overlapping data which evidenced a functional relation between the intervention and student writing performance. The students were able to maintain their gains from treatment phase without the MBGO. In addition to analysis of the essay data, the students' procedural facilitation cues were observed to examine their use, and post-intervention interviews were conducted to assess social validity. The students reported finding the intervention beneficial and expressed overall positive perceptions of the MBGO and procedural facilitation cues. Limitations, implications, and suggestions for future research are discussed.

Chapter One

The Education for All Handicapped Children Act (EAHCA, 1975) guaranteed access to public education for children with disabilities. Since then, other legislation has been introduced and enacted to address the need for students with disabilities to not only access public education but also to be placed in environments that meet their academic needs in the least restrictive settings possible (ADA, 1990; IDEIA, 2004). The No Child Left Behind Act (NCLB, 2001) called for accountability of student learning with documented yearly assessment and a goal that all students, including students with disabilities, meet or exceed state benchmarks in reading and math by the year 2014. NCLB was then replaced in 2015 with Every Student Succeeds Act (ESSA, 2015), which while still emphasizing accountability through standardized testing, allows for 10% of students with disabilities to be assessed through alternative tests.

Despite the national emphasis on improving student academic performance, cultivating writing proficiency remains as one of the greatest challenges. Only 30% of eighth- and twelfth-grade students were able to meet the *Proficient* level for writing (National Center for Education Statistics, 2012), and teachers on average spend only 15 minutes a day on writing instruction (Gilbert & Graham, 2010). This statistic is even more dire for students with disabilities for only one out of 20 are identified as having acquired adequate writing skills (Graham & Hebert, 2011). Students with emotional and

behavioral disorders (EBD) are especially at risk as they produce shorter, poorer quality, and more error-ridden written compositions compared to their non-EBD peers (De La Paz, 2001; Resta & Eliot, 1994). These writing deficits not only affect the general academic achievement of students with EBD, but they also impede the development of necessary life skills because writing is an inherent aspect of many daily activities (National Commission on Writing, 2005).

Characteristics of Students with Emotional and Behavioral Disorders

The emotional and behavioral disabilities (EBD) classification, also referred to as emotional disturbance, is one of the 13 disabilities recognized by federal special education law, IDEA. According to IDEA (Code of Federal Regulations, Title 34, Section 300.7(c)(4)(i)), students are considered to have EBD when exhibiting characteristics for a prolonged period of time that negatively impact students' academic achievement. These characteristics include: (a) an inability to learn that cannot be explained by intellectual, sensory, or health factors, (b) an inability to build or maintain satisfactory interpersonal relationships with peers and teachers, (c) inappropriate types of behavior or feelings under normal circumstances, (d) general pervasive mood of unhappiness or depression, and (e) a tendency to develop physical symptoms or fears associated with personal or school factors. It further specifies that children who have schizophrenia are included in this disability category while those who are socially maladjusted are not unless they also have emotional disturbance (Code of Federal Regulations, Title 34, Section 300.7(c)(6), 2006, p.46756).

According to the 2016 annual report to Congress by the U.S. Department of Education's Office of Special Education Programs (OSEP), in the fall of 2014, there were 5,944,241 students in the United States between the ages of six to 21 served under IDEA (OSEP, 2016). Of the total, 5.9% served under the category of having emotional disturbance, which accounted for approximately 351,000 students. The number of students identified as having emotional disabilities is falling: these students made up 0.7% of the student population between 2005 and 2007, 0.6% of the population from 2008 to 2010, and 0.5% of the population from 2011 to 2014 (OSEP, 2016). This may be an indication of under-identification of students with EBD. Forness, Freeman, Paparella, Kauffman, and Walker (2012) postulate that such under-identification creates a gap between need and service, which greatly affects their academic achievement and educational progress.

Behaviors. Students with EBD express internalized and externalized behaviors that are significant enough to impact their academic achievement (Meyer, 2004). Students with internalized behaviors may present as being withdrawn, being disengaged in classroom activities, or having anxiety and/or depression (Little et al., 2010). On the other hand, students with externalized behaviors may be explosive, aggressive, defiant, antisocial, and/or disruptive (Wehby et al., 2003). Both internalized and externalized behaviors can lead to student truancy, lack of attention and motivation, and difficulties with self-regulation, and these behaviors directly influence their academic success (Kauffman & Landrum, 2013).

Academics. The academic deficits of students with EBD are well-documented. While identified primarily by their social and behavioral difficulties, students with EBD are reported to also have academic deficits across many different subjects (Lane, Wehby, Little, & Cooley, 2005). Unlike students with other disabilities, approximately 25% to 97% of students with EBD show academic underachievement and do not improve as they progress through school, and this trend often worsens (Nelson, Benner, Lane, & Smith, 2004). In other words, in primary school, students with EBD are up to two grade levels below their peers, and the gap increases as they continue on to secondary school (Kauffman & Landrum, 2013). Compared to students with other high incidence disabilities, such as learning disabilities, students with EBD are more likely to earn grades below C; with rates of 8% v. 14% respectively (Sanford et al., 2011). They are also more likely to fail courses, have higher rates of grade retention, and have greater school absenteeism.

With the compounded pressures of both academic and behavioral challenges, the prospect of school success is daunting for students with EBD (Trout, Nordness, Pierce, & Epstein, 2003). However, studies show that such problem behaviors are likely to decrease when students with EBD are more academically engaged (Reid et al., 2004).

While it is important for scholars to explore all areas of academic difficulties for students with EBD, writing interventions were the focus of this study. Literacy interventions have been shown to significantly correlate with an individual's ability to better access the curriculum, which in turn correlates with more opportunities to learn (Langer & Applebee, 1987). This provides a more level playing field for students with

EBD. In addition, writing is the most common medium used to assess student learning (Graham, 2006) which is essential in accurately determining appropriate academic support.

Statement of the Problem

Writing is a complex skill that requires higher-level thinking (Harris, Graham, & Mason, 2003; Mason, Kubina, & Taft, 2011). The intellectual process of writing is “messy,” complex, iterative, and necessitates “strategic action and thinking” (Flower & Hayes, 1997, p. 449). Flower and Hayes (1980) described writing instruction as a problem-solving approach, breaking down the writing process into planning, idea generation, construction for an audience, and teaching and using heuristics. These were further broken down into more detailed steps. Flower and Hayes (1981) later built on this idea to develop the cognitive model theory of the writing process, which became a seminal framework that is recognized by other influential researchers including Bereiter and Scardamalia (1987) and Graham and Harris (1993).

Cognitive writing model. Flower and Hayes’s cognitive writing model (1981) has four major components: (1) the writing process is a collection of smaller, yet separate processes that must be managed by the writer; (2) the processes are organized in a hierarchy with each rooted and incorporated in another; (3) writers create their own group of writing goals to guide their thinking processes; and (4) these goals are developed by having “high-level” goals combined with sub-goals that aid in reaching the larger, more complex goals. This is a recursive process that involves revisions or additions of text based on the knowledge acquired by the writer during the process of writing.

According to Flower and Hayes (1981), and in contrast to the stage model of writing, which focused on improving the final writing product (p. 367), the cognitive writing model's focus is on developing the internal practices that are necessary to produce writing compositions. An additional point of contrast is that the stage model's structure is composed of a linear writing process, whereas the cognitive model recognizes the complexity of the non-linear process of writing and the cognitive burden it has on the writers. Therefore, Flower and Hayes present a model that allows for the units of the processes (i.e., planning, translating, and reviewing) to be an iterative activity that addresses the inner and outer factors in writing.

The cognitive writing model has three main components of composition: the task environment, writer's long-term memory, and the writing processes (Flower & Hayes, 1981, p. 369). The task environment refers to the writer's external factors such as the assignment parameters. Writer's long-term memory is the writer's knowledge of the topic and of writing in general. Task environment and writer's long-term memory effect, and are affected by, the writing process.

The writing process. The writing process involves planning, translating, and reviewing, which are constantly monitored by the writer (Flower & Hayes, 1981). Planning refers to the act of rendering thoughts, keywords, or phrases that represent ideas to expand into prose. These acts include generating ideas and organizing the ideas, which are then guided by goal setting (e.g., "I want to make sure I include this information"). Translating is the act of transferring the keywords and phrases from the planning stage to prose. Reviewing includes evaluating and revising the written prose to correct and refine.

These elements are not in sequential order, but one may interrupt another if the writer finds it necessary. Furthermore, each component during the writing process is monitored continuously as the writer determines when to transition from one aspect to another.

The cognitive writing model helps students to become experienced writers with better-developed compositions. However, it requires sophisticated and complex skills that pose much difficulty and frustration for students with EBD as they are more likely to display language deficits and expressive delays (Benner, Nelson, & Epstein, 2002; Reid et al., 2004).

Persuasive genre. While the complexity of writing has already been established, specific genres, such as persuasive writing, may exacerbate the difficulty of skill acquisition. Persuasive compositions and the related components are considered difficult for students to produce and understand (Gillespie, Olinghouse, & Graham, 2013). This may be because persuasion requires writers to engage in two-sided thinking to be able to consider different opinions and perspectives (Felton & Herko, 2004). It also involves a higher level of thinking and is more difficult to master than other genres (Burkhalter, 1995; Nippold, 2000; Uccelli, Pobbs, & Scott, 2013). Attention to persuasive writing instruction is particularly necessary as high stakes tests, aligned with state curricula, often use persuasive writing to measure student achievement. These tests include those aligned with the Common Core State Standards (CCSS, 2010), which has been implemented in 46 states, and college entrance exams like the SATs and ACTs (ACT, 2016; College Board, 2016).

Writing and students with EBD. Past research indicates that students with EBD experience difficulties with writing skill acquisition and this has a significant impact on their writing performance (Coker & Lewis, 2008; Graham & Perin, 2007; Semrud-Clikeman, Walkowaik, Wilenson, & Butcher, 2010). Results suggest that writing produced by students with EBD is shorter in length, of poorer quality, inclusive of a greater number of errors, and missing a larger number of essay elements than the writing done by students without EBD (De La Paz, 2001; Re et al., 2007; Resta & Eliot, 1994). This may be partially resulting from their difficulties with executive functioning and the related skills needed for successful writing (De La Paz, Swanson & Graham, 1998; Graham, 1997).

Executive functioning and writing. Executive functioning (or control) is referred to as a group of skills, resources, and motivations used to achieve the desired goal. This may involve analysis of situations, thoughtful decision-making, attention regulation, and cognitive flexibility (Graham, Harris, & Olinghouse, 2007). Two of the main components of executive functioning that affect writing are working memory and attention deficits (Martinussen & Major, 2011). To address these deficits and the impact they have on writing, the complex tasks involved should be broken into smaller components with self-regulation supports (Martinussen & Major, 2011). Many students with EBD have an undeveloped executive functioning (Jacobson & Reid, 2010; Montgomery, Semru-Clikeman et al., 2010; Stoesz & McCrimmon, 2012; Walshaw, Alloy, & Sabb, 2010), and this deficit may greatly impact their writing skills. Hooper, Swartz, Wakel, De Kruif, and Montgomery (2002) investigated the relationship between

writing and executive functioning and found that poor writers exhibited more difficulties with the executive function-based tasks, including the ability to plan, have mental flexibility, and self-regulate, by the researchers. While they were not able to conclude that their writing struggles were solely due to their poor executive function, they hypothesize that it was at least as important as any other factor. This conclusion echoed the results of previous studies conducted with struggling writers with disabilities (De La Paz, Swanson & Graham, 1998; Graham, 1997).

Mobile technology and writing. Mobile technology, a handheld device with access to digital information, has been used in education for its portability and ease of use (Johnson, Levine, & Smith, 2009). Mobile technology, more specifically tablets such as iPads, can be beneficial in literacy instruction. Advantages for using tablets for literacy instruction include students' familiarity with iPad usage, increase in collaboration between students, diverse apps available for differentiated assignments, quick power on and off for minimal transition time, store easily in student desks, and can display multiple languages (Hutchison, Beschoner, & Schmidt-Crawford, 2012). In addition, using iPads to write have shown to have a positive impact on students' attitudes, behaviors, and social interaction as well as improve writing quality (Sessions, Kang, & Womack, 2016).

Writing interventions. Graham and Perin (2007a) conducted a meta-analysis of writing interventions for adolescent students with disabilities to determine evidence-based practices. Although data of students with emotional and behavioral disorders were not disaggregated, the authors presented interventions that have shown to be effective with struggling writers and students with disabilities. They assessed 123 articles which

generated 154 effect sizes of treatments divided into 11 categories: (a) strategy instruction, (b) summarization, (c) peer assistance, (d) setting product goals, (e) word processing, (f) sentence combining, (g) inquiry, (h) prewriting activity, (i) process writing approach, (j) study of models, and (k) grammar instruction. Strategy instruction ($n = 20$) yielded the highest effect size with 1.03. Of the treatments that were categorized under strategy instruction, the self-regulated strategy development (SRSD) model ($n = 8$) yielded an effect size of 1.15 compared to non-SRSD treatments ($n = 12$), which yielded an effect size of .95.

Strategy instruction and EBD. One evidence-based practice for writing in special education is strategy instruction, a writing strategy that is taught explicitly and directly to guide a student towards independent writing (Graham & Perin, 2007b). Of the strategy instruction treatments, SRSD has shown positive results for students with EBD. Ennis and Jolivette (2014) reviewed 14 articles published between 2006 and 2012 and found that all yielded positive outcomes in at least one of the measures with varying effective sizes.

An updated search of self-regulated strategy development (SRSD) studies for students with EBD is presented in Table 1 in Chapter 2. The literature search resulted in 14 SRSD studies for students with EBD. All 14 studies yielded effectiveness in the writing quality measure, albeit in varying degrees.

While strategy instruction, including the SRSD model, is well established for its positive effects with students with EBD, most strategies focus on improving student recall of specific essay elements rather than developing the cognitive processes needed to

generate content for the text. Determining how to develop ideas and generate text can be a major challenge for struggling writers (Bereiter & Scardamalia, 1987, p.7).

Procedural facilitation. Bereiter and Scardamalia (1987) suggest that procedural facilitation may be used to address the difficulty of generating ideas and content that many struggling writers experience. The authors developed procedural facilitation using the cognitive model of the writing process as a framework (Bereiter & Scadamlia, 1987). The Flower and Hayes (1981) cognitive model consisted of three elements: task environment (information related to the writing assignment), the writer's long-term memory (background knowledge), and different phases of writing (e.g., planning, drafting and revising). Procedural facilitation expanded on that model with the aim of transitioning knowledge-tellers (novice writers) into knowledge-transformers (mature writers). Procedural facilitation is a set of procedures that "provide cues or routines for switching into and out of new regulatory mechanisms while keeping the executive procedure as a whole intact and...minimize the resource demands of the newly added self-regulatory mechanisms" (p. 254). Cues are often presented in various prompts (e.g., think sheets, cue cards, graphic organizers, and flow charts) with a variety of platforms (e.g., worksheets, computer software, video images), and these prompts reduce the cognitive burden while writers are engaged in complex skills, such as ideation.

Rationale for Current Study

Despite the established need, the number of writing studies for students with EBD is limited. An analysis of special education journals that covers a span of 19 years found only 1.5% of the articles published were intervention research that included students with

EBD (Mastropieri et al., 2009). In 2003, of the 55 academic interventions of students with EBD reviewed by Mooney, Epstein, Reid, and Nelson (2003), 37% were on reading, 31% were on math, and only 11% focused on writing interventions. Research interventions for writing with students with EBD are often ignored (Lane, 2004).

Writing requires sophisticated thinking to accommodate many parts of the writing process (Flower & Hayes, 1981) including planning, composing and revising. Although researchers agree on the importance of ideation in the planning of writing, especially in the cognitive writing model (Bereiter & Scardamalia, 1987; Flower & Hayes, 1981; Kellogg, 1994), little research has been conducted on the quantities of idea generation. In fact, Crossley, Muldener, and McNamara (2016) state that at the time of their study, to the best of their knowledge, there has been no research study published on the relationship between cohesion features, elements of idea generation, and holistic writing quality.

Another area that may be especially overlooked is the use of technology in writing interventions (MacArthur, 2009). The Department of Education's National Technology Plan (NETP, 2010) asserted the necessity of incorporating technology in education as a powerful tool for instruction, engagement, and assessment of students. Due to technology's ubiquitous nature and how much it is embedded into the daily lives of students and educators, teaching with technology is essential. This is especially true for mobile technologies, such as an iPad, for students who are more engaged in learning when such technologies are used for literacy instruction (Hutchison, Beschoner, & Schmidt-Crawford, 2012). Despite the evidence of positive outcomes such as the use of

technology for supporting struggling writers (e.g., Cutler & Graham, 2008; Delgado, Wardlow, McKnight, & O'Malley, 2015; Thomas, Herring, Redmond, Touro, & Smaldino, 2013) and the greater access to technology in today's schools (NETP, 2010), the quantity and the quality of research still lacks in this area (McArthur, 2009). The integration of technology and writing instruction is promising as more recent studies are showing favorable results for supporting struggling writers with disabilities.

Extension and Replication of Previous Research

Evmenova and Regan (2012) developed a technology-based graphic organizer (TBGO) as part of a U.S. Department of Education, Office of Special Education and Rehabilitative Services (OSERS) Stepping-Up Technology Implementation grant referred to as Project **Writing Effectively, Graphic Organizers, Teachers Integrating Technology** (WeGotIt). WeGotIt is a comprehensive writing program that includes five instructional lessons and the TBGO. The TBGO is offered in three different platforms: (a) a computer-based graphic organizer (CBGO), (b) a mobile-based graphic organizer (MBGO), and (c) a web-based graphic organizer (WBGO) for three different genres (i.e., persuasive, argumentative, and personal narrative). The WeGotIt TBGO incorporates research and evidence-based practices to support struggling writers as they write a well-developed one paragraph essay. The evidence-based strategies embedded in the TBGO include a mnemonic strategy called IDEAS, which for the persuasive genre stands for **I**dentify your opinion, **D**escribe three reasons, **E**laborate with examples, **A**dd transition words, and **S**ummarize. This mnemonic recall is reinforced with a visual prompt (a pop-up text when the mouse hovers over the letters of the mnemonic) and an audio prompt (when a

light bulb graphic is selected). Also, components of strategy instruction are embedded in the TBGO with goal setting to indicate the number of examples the writer wants to include to support their opinions, self-monitoring with a checklist to assess completion, and a final self-evaluation component after the completion of the essay.

In addition to the TBGO, WeGotIt also includes a four-part instruction for the persuasive genre on: (1) the purpose of persuasive essays, (2) the IDEAS mnemonic to learn parts of a persuasive essay, (3) modeling and guided practice on the use of the TBGO, and (4) independent practice of the TBGO.

Replication. Evmenova and colleagues (2016) investigated the effectiveness of the CBGO, presented in Microsoft Word® for ten middle school students with high incidence disabilities including EBD, attention deficit hyperactivity disorder, learning disabilities, and autism spectrum disorder. Findings indicated that when students used the CBGO, the writing of eight students showed an increase in number of words, nine students increased their number of sentences in an essay, and all ten students increased the number of transition words, number of parts, and holistic writing quality scores of their essays. Later, Regan et al. (2017) replicated the study with the CBGO, but with teachers as interventionists. The 17 participants, divided into three groups, were struggling writers with and without disabilities in an urban, Title I school. All three middle school-aged groups showed improvements in all measures including number of words, number of sentences, number of transition words, number of parts, and holistic writing quality.

Extension. The current study extended previous research (Evemenova et al., 2015, Regan et al., 2017) in five ways. First, it presents the graphic organizer using an MBGO, (i.e., an app on an iPad®,) instead of a computer. iPads have shown to aid in the acquisition of new skills needed for writing in classrooms (Hutchison & Beschorner, 2015). Furthermore, technology is an area of research that shows promise on learning outcomes (Campigotto, McWen, & Demmans Epp, 2013), and is in need of further research (Picard, Martin & Tsao, 2014).

Second, the current study incorporated procedural facilitation components in the form of cues to support the users' ability to brainstorm successfully by using self-questioning to generate ideas to support opinions (Flower & Hayes, 1981). Third, the ideas generated was measured by two additional dependent variables, functional essay elements, and coherence. To address the lack of research on ideation in student writing (Crossley, Muldener, & McNamara, 2016), functional elements will determine the quantity of ideas generated and coherence will assess the length of logical thought sequence.

Fourth, students with EBD were chosen as the targeted population of the current study with the aim of reducing the gap of academic research present between students with EBD and other high-incidence disabilities (Mastropieri et al., 2009). Finally, the present study modified the instruction used in former studies (i.e., lesson plans), that accompanied the graphic organizer, to teach the use of self-questioning procedural facilitation cues.

Theoretical framework. The current study was guided by Bereiter and Scardamalia's (1987) procedural facilitation of the knowledge-telling and knowledge-transforming writing models. Procedural facilitation provides a framework for a novice writer to become a more mature writer by introducing a difficult writing skill explicitly and systematically and by allowing the writer to depend on external support for the newly acquired skill. The four components of procedural facilitation were addressed in the intervention of this study. First, the identified self-regulatory function found in an expert skill must be identified, and in this study, it is the idea generation of reasons to support opinions in persuasive essays. This study used procedural facilitation cues to incorporate ideation in the intervention, an important, but under-researched topic.

The second component of procedural facilitation was to explicitly describe the function of the target skill, idea generation. Idea generation, or ideation, is a fundamental component of writing that is often described as part of prewriting or brainstorming (Bereiter & Scardamalia, 1987; Flower & Hayes, 1981). It refers to the production of thoughts or viewpoints that denote a specific topic. Creativity, appropriateness, and the number of ideas produced are all important elements of ideation (Crossley, Muldner, & McNamara, 2016).

The third component of procedural facilitation involves cues that are provided to help writers access the skill through the external support. This is to avoid knowledge-telling and instead encourage knowledge-transforming (Bereiter & Scardamalia, 1987). In the current study, self-questioning cues were provided in the brainstorming section as a surrogate for feedback that a person may have in conversations to develop thoughts and

engage in information exchange (Bereiter & Scardamalia, 1987). There were seven cues in the WBGO of which students could choose three. Answering the question cues acted as a support for students to respond the given prompt.

Finally, the fourth component of procedural facilitation is to incorporate a set of instruction with external supports meant to cognitively unburden the students when they are engaged in a complex activity, like writing. The present study had a set of four lesson plans that introduced essay writing components and ways to use the cues for the brainstorming. Instruction included modeling, guided practice and independent practice with feedback. After practicing the use of the graphic organizer with embedded supports (external support), students had the opportunity to write independently without the graphic organizer to show whether they were able to internalize the learned strategies from the intervention.

Purpose of the Study

The purpose of this study was to replicate and extend research by Evmenova et al. (2016) and Regan et al. (2017) to determine the functional relation between a mobile-based graphic organizer with embedded procedural facilitation and the persuasive writing performance of students with EBD. The research questions were as follows:

1. Is there a functional relation between using a mobile-based graphic organizer with embedded procedural facilitators and improvements in the number of words, sentences and transition words of persuasive writing for middle school students with emotional and behavioral disorders?

2. Is there a functional relation between using a mobile-based graphic organizer with embedded procedural facilitators and improvements in the essay elements and coherence of persuasive writing for middle school students with emotional and behavioral disorders?
3. Is there a functional relation between using a mobile-based graphic organizer with embedded procedural facilitators and improvements in the holistic quality of persuasive writing for middle school students with emotional and behavioral disorders?
4. Do middle school students with emotional and behavioral disorders maintain the number of words, sentences, transition words, holistic quality, functional elements and coherence in persuasive writing when a mobile-based graphic organizer is no longer available to them?
5. How do middle school students with emotional and behavioral disorders use the embedded procedural facilitation features in the brainstorming component when independently completing the mobile-based graphic organizer to write a persuasive essay?

Definition of Terms

App – Software designed to be used on mobile devices.

Emotional and behavioral disorder (EBD) – EBD, also referred to as emotional disturbance, is one of the disabilities classified in Individuals with Disabilities Education Act (2004) for special education. According to IDEA, students with EBD are

characterized as having a condition of one or more of the following for an extended period of time to a marked degree: (a) an inability to learn that cannot be explained by intellectual, sensory, or health factors; (b) an inability to build or maintain satisfactory relationship with peers and teachers; (c) inappropriate types of behavior or feelings under normal circumstances; (d) a general pervasive mood of unhappiness or depression; or (e) a tendency to develop physical symptoms or fears associated with personal or school problems. This definition includes schizophrenia but does not extend to children who are socially maladjusted, unless they are deemed to have an emotional disturbance (Code of Federal Regulations, Title 34, Section 300.7(c)(6), 2006,).

Graphic organizers – Visual arrangements of words and/or pictures intended to represent the conceptual organization of ideas in text.

Ideation – The process of generating thoughts and ideas that are original and are related to the topic.

Middle school student – Students enrolled in seventh or eighth grade or of age equivalence.

Mobile device – A small computing device that includes a display screen and an operating system, including but not limited to laptops, smartphones, and tablets.

Persuasive essays – A genre of writing invoking the use of arguments and rationale to influence readers in some way.

Procedural facilitation – Supportive procedure that helps to minimize cognitive demands of inexperienced or less experienced writers while they perform cognitively demanding tasks (Bereiter & Scardamalia, 1987). Procedural facilitation includes four components:

(1) identifying function in an expert skill, (2) explicitly describing target skill, (3) creating an external structure to support skill, and (4) instructing the use of the external support of the skill.

Chapter Two

This chapter reviews existing literature on writing research for students with emotional and behavioral disorders (EBD). The chapter will describe characteristics of students with EBD and their writing challenges; give an overview of research-based writing interventions for students with EBD including a dialogue journal, peer tutoring, and self-regulated strategy development (SRSD); present a comprehensive literature review on procedural facilitation in writing interventions; and conclude with technology and writing, more specifically, computer-based graphic organizers and mobile-based writing interventions.

Characteristics of Students with Emotional and Behavioral Disorders

The legal definition of students with emotional disturbance disability, according to the Individuals with Disabilities Education Act (IDEA), describes those who are characterized as having:

...a condition exhibiting one or more of the following characteristics over a long period of time and to a marked degree that adversely affects a child's educational performance: An inability to learn that cannot be explained by intellectual, sensory, or health factors; An inability to build or maintain satisfactory interpersonal relationships with peers and teachers; Inappropriate types of behavior or feelings under normal circumstances; A general pervasive mood of unhappiness or depression; A tendency to develop physical symptoms or fears associated with personal

or school factors. The term includes children who have schizophrenia but does not include children who are socially maladjusted unless it is determined that they are emotionally disturbed. (Code of Federal Regulations, Title 34, Section 300.7(c)(4)(i))

Wagner, Kutash, Duchnowski, Epstein, and Sumi (2005) and Bradley, Doolittle, and Bartolotta (2008) analyzed two national longitudinal studies conducted on the characteristics of students with EBD. These studies, the Special Education Elementary Longitudinal Study (SEEL) and the National Longitudinal Transition Study-2 (NLTS2), provide national data on the demographics and school experiences of students identified as having EBD. The researchers found that nationally African American students are overrepresented in EBD (approx. 26%) in comparison to the overall population (approx. 16%), and male students account for almost 80%. Students with EBD have a higher likelihood of attending more schools, being retained at a grade level, and being suspended or expelled compared to students with other disabilities. These circumstances impede educational progress, which greatly weakens potential for academic success (Tout, Nordness, Pierce, & Epstein, 2003).

Students with EBD have significant academic difficulties. They are more likely to fail more courses, receive lower grades, live in poverty, and be absent from school (Kauffman, 2005; Lane et al., 2005; Nelson et al., 2004; Reid et al., 2004). It is estimated that up to 70% of students with EBD are arrested within three years of leaving school (US Department of Health and Human Services, 1999). Furthermore, students with EBD are up to two grade levels below their peers during primary school, and the gap grows as

they continue to secondary school (Kauffman & Landrum, 2013). It has been estimated that 25% to 97% of students with EBD generally show academic underachievement that often worsens as they progress through school. These students likely receive lower grades than other students with disabilities (Nelseon, Benner, Lane, & Smith, 2004; Sanford et al., 2011). This is not surprising as behaviors of students with EBD are often disruptive enough to interrupt their access to instruction (Whehby et al., 2003). One area of academic deficit is writing. This merits attention because writing is strongly linked to better access to curriculum, which is directly related to being able to learn and access information (Langer & Applebee, 1987).

Challenges of Writing

The 2001 No Child Left Behind Act (NCLB) introduced a new trend in accountability of instruction through assessment and data collection. A primary objective was that by 2014, all children (including children with disabilities) would achieve academic proficiency. NCLB increased attention to writing instruction for students by addressing the valid concerns of the National Writing Commission's findings that the American school system generally overlooks and neglects writing instruction for students. The Common Core State Standards (CCSS, 2010), adopted by 46 of the 50 states, set a goal of teaching students to become adept at composing narrative and persuasive writing. Moreover, the students in grades 6th through 8th are expected to "use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently" (CCSS.ELA-LITERACY.WHST.6-8.6).

Despite these federal and state initiatives to improve writing standards and instruction, the National Assessment of Educational Progress (NAEP, 2011) writing scores indicated that all students, both with and without EBD, have yet to reach the expected proficiency (Salahu-Din, Persky, & Miller, 2008). NAEP's most recent writing report, in 2011, showed that only 27% of eighth and twelfth graders achieved either *Proficient* or *Advanced* while the remaining 73% performed at *Basic* or *Below Basic*. The numbers for students with disabilities are even more troubling with 95% of those students failing to make adequate writing progress for academic success (Graham & Hebert, 2011).

Students with EBD and Writing

Writing challenges for students with EBD have been well-documented (Graham & Perin, 2007a; Rogers & Graham, 2008). These challenges start early on in their education, manifesting in deficits from kindergarten and continuing well into high school (Nelson et al., 2004). Students with EBD tend to write with necessary elements of good essay writing, more spelling and grammar errors, poorer organization, and lower overall writing quality (De La Paz, 2001; Kulikowich et al., 2007; Reid & Lienemann, 2006). Furthermore, these difficulties continue to affect students with EBD after they have completed their academic careers. Without the fundamental writing skills that are often necessary for basic workplace communication such as composing reports and emails (Graham & Perin, 2007), they face limited prospects for employment and promotions (MacArthur, 2009).

Writing requires a combination of complex skills (Harris, Graham, & Mason, 2003; Mason, Kubina, & Taft, 2012), which are markedly more difficult to master for students with disabilities in comparison to students without (National Commission on Writing, 2003). Often, teachers are not properly trained to address the unique learning challenges faced by students with disabilities, especially students with EBD. The difficulties students with EBD have with writing may be attributed to their deficiencies in working memory and executive functioning that directly impedes their ability to perform complex tasks (Jacobson & Reid, 2010; Montgomery, Stoesz & McCrimmon, 2012; Semru-Clikeman et al., 2010; Walshaw, Alloy, & Sabb, 2010). These deficits in executive function strongly correlate with difficulties in writing (Hopper, Swartz, Wakel, De Kruif, & Montgomery, 2002). Thus students with EBD need effective instruction to account for the discrepancy.

Although, writing interventions and programs have been widely researched to improve student writing in the field of special education (e.g., De la Paz, 2001; Harris & Graham, 1999; Lane et al., 2008), there is still a great need for intensive writing intervention research for students with EBD. Mastropieri and Scruggs (2014) acknowledge that in the last decade, research trends have shown promise as more researchers are trying to fill this need by conducting studies using interventions such as dialogue journals, peer writing, and self-regulated strategy development (SRSD).

Dialogue journals. Regan, Mastropieri, and Scruggs (2005) explored using dialogue journals with students with EBD to increase not only writing quality, but also time on task. Dialogue journals are conversations between teachers and students

communicated through written form about feelings, ideas, and experiences (Peyton & Staton, 1993). Prior to this study, dialogue journals have been found to be effective with diverse populations including gifted students, typically achieving students, English learners, deaf students, and students with learning disabilities (Regan et al., 2005). Regan et al. (2005) used a multiple-baseline single-subject method with five sixth-grade participants with EBD. The study found that, in general, there was an increase in on-task time, writing quality, and number of words written. While there have been improvements in the aforementioned areas, the intervention did not address technical aspects of writing, as it did not incorporate any explicit instruction to address planning, organizing, and articulating thoughts (Regan, Scruggs & Mastropieri, 2009). Since this study was published, there has not been further research on dialogue journals with students with EBD.

Peer writing. Peer revision writing strategies with students with EBD has been explored by Kindzierski through both alternating single-subject (2009) and qualitative (2010) methods. Kindzierski's study (2009) comprised of four dyads of peer partners that involved editing each other's writing and drafting revisions based on peer feedback. The results did not definitively indicate any positive effect from peer writing. Kindzierski and Leavitt-Noble (2010) explored these results further through qualitative methods. Their research investigated the assumptions that students with EBD can: (1) apply internalized writing strategies to their writing, and (2) give meaningful academic feedback to their peers. The themes that arose from the study suggested that students take "less capable," "capable," or "more capable" peer roles. The authors concluded that the students with

EBD would be able to do the following: improve their writing if practiced every day, be on task without direct support from teachers, and give valuable feedback to their peers.

Self-regulated strategy development (SRSD). One of the evidence-based practices in teaching writing is strategy instruction, a direct and explicit instruction to strengthen students' ability to write more advanced compositions independently (Graham & Pernin, 2006). According to the meta-analysis on strategy instruction by Graham (2008), the results indicated a large effect size with a mean of 1.15 ($n = 110$) for all studies at post-test. Moreover, the instruction model most commonly used was self-regulated strategy development (SRSD) which comprised 45% of group comparison studies and 68% of single-subject design studies. The effectiveness of SRSD strategies for students with disabilities was further supported by the meta-analysis conducted by Graham and Harris (2003). Graham and Harris's study ($n = 18$) concluded that SRSD instruction was highly effective for improving student writing.

SRSD, developed in the 1980s by Drs. Graham and Harris, is a comprehensive model that addresses all components of writing as well as motivation, attitudes, and beliefs that are related to the writing process (Harris, Graham, Mason, & Friedlander, 2008). The model includes goal setting, self-monitoring, self-instruction, and self-reinforcement presented in six instructional stages over 8 to 12 lessons lasting 30 to 40 minutes, at least three times per week (Harris et al., 2008). The six stages, as described by Harris et al. (2008), are (1) developing background knowledge and prerequisite skills, (2) discussing the benefits and importance of the writing strategy, (3) modeling steps of the strategy explicitly, (4) facilitating student memorization of the strategy through a

mnemonic that serves as a guide through the writing process, (5) monitoring student writing with support, and (6) independent use of strategy by the student.

SRSD has been widely researched for students with EBD. The literature includes three reviews of SRSD writing interventions that investigated its effectiveness for students with EBD (Ennis & Jolivette, 2014; Losinski, Cuenca-Carlino, Zablocki, & Teagarden, 2014; Sreckovic, Common, Knowles, & Lane, 2014). All three of the reviews found convincing evidence for its effectiveness and a strong indication of it being evidenced-based writing instruction for students with EBD. This effect may be attributed to the metacognitive and self-regulation strategies that SRSD provides and which students with EBD often lack (Mastroperi & Scruggs, 2014).

An updated literature search on using SRSD writing strategies to support students with EBD was conducted for this study. Following a set literature search procedure, an article was retained if it (a) included at least one participant identified as having EBD, (b) employed experimental design, (c) was published between 2000-2015, and (d) was peer-reviewed. The search yielded 14 articles, which are described below in Table 1.

Table 1

Summary of SRSD Articles on Students with EBD

Study	Design	Intervention	DV	Writing Quality	Genre
Adkins & Gavin (2012)	MBD	POW+WWW	Length, quality, elements	Improved	N

Cuenca-Carlino & Mustian (2013)	MBD	POW + TREE	Length, quality, elements, parts, self-determination, self-efficacy	Effective intervention	P
Cuenca-Sanchez et al. (2012)	PPED	POW + TREE	Length, transition words, essay parts, paragraph, quality, self-efficacy, self-determination	Intervention yielded significant effects	P
Ennis et al. (2013)	PPED	STOP, DARE	Length, quality, elements, on-task behavior	Intervention yielded significant effects	P
Ennis & Jolivet (2014)	MBD	STOP, DARE	Elements, quality, motivation, self-efficacy	Improved	P
Hauth et al. (2013)	MBD	POW + TREE	Length, quality, parts, paragraphs	Improved	P
Kiuhara et al. (2012)	MBD	STOP, AIMS, DARE	Length, quality, elements, time spent on planning and writing	Improved	P
Mason et al. (2011)	MBD	POW + TREE	Length, quality, elements	Intervention yield medium effect	P
Mason et al. (2009)	MBD	POW + TREE	Length, quality, fluency	Improved performance	P
Mason et al. (2010)	MBD	POW + TREE	Length, quality, fluency	Improved performance	P
Mason & Shriner (2008)	MBD	POW + TREE	Length, quality, elements, transition words	Intervention yield very effective	P

(PND)					
Mason et al. (2006)	MBD	TWA + PLANS	Retell (oral and written)	N/A	E
Mastropieri et al. (2009)	MBD	POW + TREE	Length, transition words, essay parts, paragraph, quality, fluency, on-task behavior	Effective intervention	P
Mastropieri et al. (2012)	MBD	POW + TREE	Elements, quality, fluency, on-task behavior	Improved	P
Mckeown et al. (2015)	MBD	AAF	Length, quality, revisions	Improved	N

Note. MBD = Multiple-Baseline Design (Single-subject); PPED = Pre-Post Experimental Design; POW = Pick my idea, Organize my notes, Write and say more; TREE = Topic sentence, Reasons, Explain reasons, Ending; PLANS = Pick goals, List ways to meet goals, And make Notes, Sequence notes; TWA = Think before reading, think While reading, think After reading; STOP, AIMS, DARE = Suspend judgment, Take a side, Organize ideas, Plan more as you write, Attract the reader's attention, Identify the problem, Map the context of the problem, State the thesis, Develop your topic sentence, Add supporting ideas, Reject an argument for the other side, End with a conclusion; AAF = Asynchronous Audio Feedback; N= Narrative; P=Persuasive; E=Expository

POW+TREE for persuasive essays. POW+TREE is an SRSD instruction for persuasive writing strategy that helps students develop their own thoughts and opinions before and during their writing process (Graham, Harris, & Mason, 2005). The mnemonic POW+TREE stands for **P**ick an idea, **O**rganize notes, **W**rite and say more + **T**opic sentence, **R**easons, **E**nding, and **E**xamine. The POW refers to the overall writing process as students are encouraged to pick a side of an idea they wish to support, use their

notes (TREE), organize and develop a plan for writing, and write a well-developed composition.

Mason and Shriner (2008) examined the writing performance of second- through fifth-grade students with EBD using POW+TREE. The researchers who had experience with reading and writing SRSD instruction implemented all instruction. Students were given 11 to 13, 30-min sessions of POW+TREE instruction, which consisted of the six stages above. Students also completed a post-instruction assessment essay in one or two 30-min sessions. While the overall results were positive, there were mixed effects across different phases. All students, except one, improved in the number of parts, quality of the essay, and number of words written. Group 1 (the younger group of students) had percentages of nonoverlapping data (PND) of 100% for instruction, 77% for post-instruction, and 100% for maintenance for number of essay parts. Group 2 (the older students) had 100% PND for all three phases. The number of transition words used was above the baseline for both groups (Group 1: $M = 10.14$; Group 2: $M = 33.25$). Moreover, the score for the quality of essays improved for both groups when comparing baseline (Group 1: $M = .07$; Group 2: $M =$ not reported) to instruction (Group 1: $M = 4.91$; Group 2: $M = 4.89$), (Group 1: $M = 4.44$; Group 2: $M = 33.25$) and maintenance (Group 1: $M = 4.00$; Group 2: $M = 4.0$).

Mason, Kubina, and Taft (2009) examined persuasive writing at a secondary school by focusing primarily on short, 10-minute persuasive writing using POW+TREE with students with learning disabilities (LD) and/or attention-deficit/hyperactivity disorder (ADHD). All participants showed improvements in parts and the quality of the

essays. Mason et al. (2010) extended their previous study (2011) by: (1) adding guided practices, and (2) investigating the effects on students with EBD instead of students with LD and ADHD. One-on-one instruction with a researcher was given over five 30-minute and three 10-minute sessions in the course of two to three weeks. Overall, the results indicated improvements in quality (baseline: $M = 2.8-4.13$; instruction: $M = 6.71-7.00$; post-instruction: $M = 6.00-7.00$; maintenance: $M = 5-7$) and number of parts written (baseline: $M = 6.38-9.17$; instruction: $M = 9.00-9.71$; post-instruction: $M = 8.60-10.20$; maintenance: $M = 8-11$). All but one student decreased in the number of words, which was attributed to the students being able to eliminate repeated reasons and unnecessary information after the intervention. Mason, Kubina, and Hoover (2011) replicated the previous research with three high school students. Again, the students were given one-on-one instruction with a researcher in five to seven sessions over a 20- to 35-day period. The PND results were medium effect in quality (post-instruction: 79%; maintenance: 83%) and small effect in number of parts (post-instruction: 68%; maintenance: 50%).

Mastropieri et al. (2009) also conducted research using POW+TREE with secondary students in a public day school for students with EBD. Using a multiple-baseline design, 15 students were separated into four groups. The study took place over four months and 55 sessions. The results indicated substantial improvements at post fluency in overall quality ($ES = 2.22$), number of words ($ES = 1.72$), sentences ($ES = 2.22$), essay parts ($ES = 2.47$), transition words ($ES = 2.46$), and paragraphs ($ES = 1.53$), with a small effect on number of words (post-instruction: 68%; maintenance: 66%). Mastropieri et al. (2012) later use POW+TREE to investigate the fluency of persuasive

writing by placing the limitation of ten minutes of planning and writing time. Using a multiple-baseline design across participants, the researchers found that there was significant difference in total elements and quality of writing in all phases including post-intervention, post fluency, maintenance (untimed), generalization (untimed), fluency maintenance (timed), and fluency generalization (timed).

Cuenca-Sanchez, Mastropieri, Scruggs, and Kidd (2012) also examined the use of POW+TREE on middle school students with emotional disabilities; however, in addition to the quality and maintenance of the writing, they measured how SRSD instruction taught with self-determination components affect student self-determination and perceived self-efficacy. Using a group experimental design, they found the students in the experimental group (1) showed significance over the control group, (2) were able to maintain gains, (3) had significance in self-efficacy ($t(19) = 2.24, p = .037$) and self-determination ($t(19) = 6.72, p = .000$). Cuenca-Carlino and Mustian (2013) replicated the earlier studies (e.g., Cuenca-Sanchez et al., 2012; Mastropieri et al., 2009) by using POW+TREE to support students with emotional and behavioral disorders and results indicated significant gain in writing performance (i.e., words written, sentences, paragraphs, transition words, essay parts and holistic quality), self-determination ($z = -2.69, p < .05$), and self-efficacy ($z = -2.55, p < .05$).

Hauth, Mastropieri, Scruggs, and Regan (2013) used the POW+TREE strategy in content areas of civics and mathematics to measure persuasive essay writing. They extended a previous study by Mastropieri et al. (2009) by including two more phases of the intervention. The students were given lessons on content knowledge and

corresponding persuasive prompts, for example, “Persuade your friend to use PEMDAS when solving equations.” They found effectiveness on all measures (i.e., total words, sentences, paragraphs, transition words, essay parts, and holistic quality) across all phases (i.e., post-SRSD intervention, post SRSD intervention + content, generalization, maintenance, and maintenance SRSD + content).

STOP, DARE for persuasive essays. STOP AIM DARE (Suspend judgment, Take a side, Organize ideas, Plan more as you write, Develop your topic sentence, Add supporting ideas, Reject an argument for the other side, End with a conclusion (e.g., Ennis et al., 2013; Ennis & Jolivet, 2014), and more recently Kiuvara and colleagues (2012) included Attract the reader’s attention, Identify the problem, Map the context of the problem, State the thesis (AIMS) to STOP, DARE, and were used to explore persuasive writing through mnemonic supported SRSD programs.

Kiuvara, O’Neil, and Graham (2012) examined the effects of STOP, AIMS, and DARE on high school students in planning and writing persuasive essays using a multiple-baseline design. The measured variables include persuasive elements, total words written, essay quality, time planning, and writing. The findings indicate that there are functional relationships established in each of the measures and the strategy intervention as determined through visual analysis and the overall mean of each phase of the design.

Ennis, Jolivet, and Boden (2013) investigate the use of STOP, DARE with 16 elementary school students with EBD using a group experimental design. They measured students’ Strength and Difficulties Questionnaire (SDQ), Systematic Screening

for Behavioral Disorders (SSBD), academic engagement, and writing achievement (i.e., Woodcock-Johnson III writing fluency) to create comparable groups for the treatment and control. The treatment means of the measures (i.e., writing quality, essay elements, total words written, and WJIII writing fluency) were higher than the control mean; however, the significance of the measures yielded mixed results.

Ennis and Jolivette (2014) studied the effects of STOP, DARE (an SRSD strategy) on writing skills (*essay elements, quality, and correct word sequence*), writing motivation, and self-efficacy. A multi-probe multiple-baseline single-subject design was conducted in a health class with 12 students who were all 15 years old and in the ninth grade. Measures on writing skills indicated the presence of a functional relationship between the skills and the intervention; however, writing motivation and self-efficacy were of mixed results.

Summary of SRSD interventions for students with EBD. As the aforementioned studies all yielded improved performance in quality of writing, it can be concluded that research supports the efficacy of self-regulated strategies in persuasive essay writing for students with EBD. Further analysis of the retained articles indicate that multiple-baseline single-subject research design ($n = 13$, 86.7%) was the most common method, with only two studies (13.3%) using group pre- and posttest experimental design. In addition, of the retained articles from the search, 12 out of 15 were of persuasive genre that used POW+TREE ($n = 9$; 75%) and/or STOP, DARE ($n = 3$; 25%) mnemonic strategies. Finally, all of the interventions incorporated the use of a graphic organizer, an evidence-based practice (Ciullo & Reutebuch, 2013; Dexter & Hughes, 2011; Hughes,

Maccini, & Gagnon, 2003). The treatment results of the articles show promise in narrowing the writing gap between students with EBD and their typically learning peers. The use of procedural facilitation is a less explored research area that may also be beneficial in writing instruction for students with disabilities.

Procedural Facilitation and Writing

Seminal work by Bereiter and Scardamalia (1987) described the difficulty that students, both with and without disabilities, have with generating content for written language compared to that of oral language. When producing information for conversation, speakers are prompted by feedback from their partners as cues from which they can respond. This support does not exist in writing, which requires independent ideation. Novice (or immature) writers are often “knowledge-tellers,” who retrieve content from whatever cues they can employ, most commonly from the topic and the assignment, and to simply “memory dump” into text which often results in incoherence and a lack of depth in their composition. Furthermore, knowledge-tellers have difficulties generating thoughts from perspectives other than their own; connecting the thoughts as possible problems of logic, coherence or appropriateness; and assessing the final product to revise and improve their writing. On the other hand, expert (or mature) writers are often “knowledge-transformers.” As knowledge-transformers, expert writers are able to develop their initial thoughts into a more sophisticated composition by the process of rethinking, revising, and restating. They can facilitate the interaction of text and knowledge processing by reflecting on possible problems and solving said problems. Knowledge-transformers practice skills that require self-regulated and executive control

such as goal setting, planning strategies, organizing, and navigating through subprocesses. Being a knowledge-transformer means having the ability to cognitively juggle many complex skills at once.

Bereiter and Scardamalia (1987) offer procedural facilitation as a tool to transform knowledge-tellers into knowledge-transformers. Procedural facilitation was developed with the purpose of providing a framework designed to ease the cognitive and executive burdens of writing experienced by novice writers, by offering cues during the writing process. Procedural facilitation consists of four major steps: (1) identifying a self-regulation function that requires expert or higher level skills to perform, (2) clearly and explicitly describing the self-regulatory cognitive function, (3) developing cues or structured procedures to minimize the cognitive demands required by the assignment; and (4) externally supporting instruction of these cues and procedures to manage and minimize cognitive demands.

Although there has been some research in using procedural facilitation to support writing with students with disabilities, the studies thus far are too few to ascertain its effectiveness (Graham & Perin, 2007). However, other studies using procedural facilitation and interventions for students with and without disabilities to support cognitive unburdening of writers indicate potential positive results for students for students with EBD. These are discussed below.

Systematic Review of Procedural Facilitation and Writing

The dual purposes of this literature review are first to aggregate the findings of writing intervention studies that have employed procedural facilitation as a theoretical

framework for treatment, and second to determine the types of implementation and its outcomes for students with and without disabilities from fourth grade to twelfth grade. As of the date of publication, this is the first comprehensive literature review of its kind on procedural facilitation, albeit several reviews and meta-analyses have been done on writing generally and have peripherally included procedural facilitation. The most notable of these reviews that addressed procedural facilitation was by Graham and Perin (2007). The authors conducted a meta-analysis on the different approaches to writing instruction and identified procedural facilitation as one of the treatment categories in four of the studies (Graham et al., 1995; Page-Voth & Graham, 1999; Scardamalia & Bereiter, 1985; Zellermayer et al., 1991). However, they were not able to definitively determine any potential effects or impacts procedural facilitation had on student writing due to the small number of effect sizes coupled with a large range of instructional methods, which made it difficult to calculate what degree of change that procedural facilitation specifically made. Therefore, this literature review seeks to build and expand upon Graham and Perin's review (2007) on procedural facilitation by conceptualizing treatments, characterizing students, identifying genres of writing, and analyzing the overall effects on writing quality as presented in existing literature.

Literature search methods. The methodology employed was a comprehensive search using multiple keywords, databases, and techniques. The search methodology will be articulated in greater detail below, as a variety of indices were used to identify and investigate studies done on procedural facilitation conducted in writing interventions for fourth through twelfth-grade students.

Online databases. To gain a general sense of the number of articles on procedural facilitation, a search was run on Google Scholar with the words *procedural facilitation*. This search yielded only 29 articles in which the words appeared together in the title. The same search was conducted with the same term on other online databases, which also resulted in a relatively small number of results similar to that found on Google Scholar. This suggests that searching keywords in conjunction (e.g., *procedural facilitation AND writing*) may have failed to capture every article on procedural facilitation conducted in writing interventions. However, the alternative (searching keywords not in conjunction) was deemed inefficient while searching in conjunction would likely capture most articles, or at least the most significant ones.

Academic databases. Various journal databases were also searched, such as ERIC, APA Psych Info, Education Full Text, Social Science Citation Index, and EBSCO. Except three articles, full texts of all articles resulting from searching these journal databases were acquired electronically through a local university and JSTOR. The other three articles, which could not be acquired electronically by those means, were obtained via inter-library loan.

Searched keywords. The keywords searched included *procedural facilitate**, *think* sheet**, *think* sheet* AND writing*, and *cue sheet**. The asterisks denote the wildcard feature of keywords searches, which allows for keyword searches with different endings concurrently.

Database searches. Of the resulting articles that came up in the database searches, those initially retained (a) were published in a peer-reviewed journal, and (b)

involved related academic fields (this did not include mathematics). Table 2 presents the database search results.

Table 2

Keyword Searches Procedural Facilitation Articles

Databases	Keywords	Yielded	Kept
ERIC	Procedural Facilitator	9	4
	Cue Cards	22	4
	Think Sheets	6	2
APA Psych Info	Procedural Facilitator	12	0
	Cue cards	89	0
	Think sheets	16	2
SSCI	Procedural Facilitator	62	5
	Cue Cards	706	1
	Think Sheets	6302	
	Think Sheets + (language: English)	5932	
	Think Sheets + Writing	66	2
EBSCO	Procedural Facilitator	10	1
	Cue Card	31	2
	Think sheets	6	0
Education Full Text	Procedural Facilitator	3	0
	Cue Card	14	1
	Think sheets	3	1
TOTAL			25

Ancestry and descendent searches. After the initial database searches, an ancestry search was conducted for the articles listed as references in the initially retained articles. This yielded an additional 12 articles. A descendant search located more articles through an inspection of the articles that have since cited the retained articles in their

studies. This yielded an additional four articles. A final descendent search was done using the seminal work by Bereiter and Scardamalia (1987) crossed with the keywords *procedural facilitation*. Ancestry and descendent searches resulted in 263 articles, of which eight were retained. This brought the total number of articles retained from the database, ancestry, and descendent searches to 49.

Criteria for inclusion. The following criteria determined which articles would be included in the literature review: (a) involved participants between fourth to twelfth grade, or corresponding ages; (b) explicitly stated procedural facilitation as part of the intervention, with the exception of Page-Voth and Graham's study (1999) as it was categorized as procedural facilitation in Graham and Perin's (2007) meta-analysis; (c) used experimental design; (d) included procedural facilitation as a writing intervention for students with and without disabilities; (e) had dependent variable holistic scores and/or overall writing quality; and (f) clearly articulated essential quality indicators as outlined by Gersten et al. (2005).

Criteria for exclusion. The initial criteria for exclusion went as follows: (a) the publication date was prior to 1990 or the results, including whether or not the intervention achieved significance (i.e., $p < .05$), were not clearly stated; (b) the articles were not peer-reviewed or were dissertations and not published, or (c) the articles were written in a language other than English. The secondary criteria for exclusion went as follows: (a) non-experimental design, or (b) studies that implemented interventions with students learning English as a second language.

Final sample. After applying the inclusion and exclusion criteria, 18 articles

resulted from the literature review. The final selection of the articles represents a wide range of the uses of procedural facilitation in writing (see Table 3). The articles included in the pool were located in the following peer-reviewed research journals: *American Annals of the Deaf*, *American Educational Research Journal*, *British Journal of Educational Psychology*, *Journal of Behavioral Education*, *Computers in Human Behavior*, *Journal of Direct Instruction*, *Journal of Educational Computing Research*, *Journal of Educational Psychology*, *Journal of Learning Disabilities*, *Learning Disabilities Research*, *Learning Disabilities Research & Practice*, *Learning Disability Quarterly*, and *Reading & Writing Quarterly*.

Table 3

Procedural Facilitation Articles Included in the Review by Treatment Categories

Study	Design	<i>n</i>	Grade	Genre	Part.	PF	Intervention Description	Sig.?
<i>Strategy Instruction</i>								
Bryson & Scardamalia (1996)	Group	31	10 th	P	GE; LD	EBD Prompts (MUSE & MyWord)	Both groups included writing instruction (SRI or ESK), modeling thought and software instruction (MUSE or MyWord) Strategies for Reflective Inquiry (SRI) Group: - SRI Instruction (Plan, ID Confusions, ID New Learning, Build an Argument, Challenge Assumptions, Elaborate Statements, Search for Additional Ideas, and Put it Together) - MUSE Instruction (software described as EBD “learning environment” with self-directed prompts with shared note-taking features presented in pictures and notes) Explicit Structural Knowledge (ESK) Group: - Instruction on elements of valid arguments (Beliefs For, Beliefs Against, Reasons For, Reasons Against, Facts, Descriptions, Examples, and Conclusions) - MYWord Instruction (word processing software with self-directed prompts with note-taking features that can be shared with others)	Yes; SRI>ESK

Englert et al. (1991)	Group	183	4 th -5 th	E	GE; LD	PB Prompts (Think Sheets)	One-hundred and eighty-three students (55 with LD were selected, categorized (high achieving (HA), low achieving (LA), and with a learning disability (LD)) then placed in either control or treatment group. Control: No extra support given to write their essays on paper Treatment Group – Cognitive Strategy Instruction in Writing (CSIW): - POWER (plan, organize, write, edit/editor, revise) Think sheet for each of the POWER. - Each of the think sheets was taught in four phases: (1)text analysis (2)teacher modeling (3) student participation with class paper (4) independent writing	Yes; Treatment nt> Control for LD vs. HA
Scanlon et al. (2009)	RMD	98	8th	P; E	GE; LD	PB Prompts (Think Sheet)	Graphic procedural facilitator called PROVE (present, reveal, offer, verify, express) Sheet were taught through scaffolded instruction at least 2 lessons per week for 6 weeks of intervention. Pre- and post-tests in form of essay writing were measured.	Yes; Posttest > Pretest

Alternate Modes of Composing

Englert et al. (2005)	RMD	12	4 th -5 th	E	LD	WB Prompts (TELE-Web)	Technology-Enhanced Learning Environment on the Web (TELE-Web) With Support : Teacher-directed support using technology - Instructions/prompts for each customizable box on what to goes in the box, text-to-speech, spell check, etc., TELE-Web Without Support: No instruction/prompts given	Yes; TELE-Web >Paper-Pencil
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- Only title box and text box, but with text-to-speech and spell check

Paper-Pencil Without Support: Paper and Pencil

- Only blank paper with pencil given

Englert et al. (2007)	Group	35	4 th -6 th	E	LD; ID; EBD; Other	WB Prompts (TELE-Web)	Both control and treatment groups had similar instruction on different platforms (WB vs. Paper-Based)	Yes; TELE-Web>C control
							- Instruction: (1) explanation of writing paper (2)concept map given with modeling (3) independent writing for each paragraph of map (4) teacher modeled topic sentences and details (5) how to generalize composition - Essay written on with paper and pencil	
							Control (Paper-Based): Instructed by special education teachers who routinely use technology in their teaching. Essays written on with paper and pencil	
							Treatment Group - TELE-Web: Instructed by special education teachers to students who routinely use TELE-Web (built-in prompts and supports). Essays written on TELE-web software	

Strassman & O'Dell (2012)	RMD (MM)	64	6 th -8th	P; E	d/Deaf; HH	IB Prompts (Still images/Video clips)	Authoring with video (AWV) was created through using MAGpie (free software). AWV creates a footage which is the backdrop for each student's written text, similar to captioning.	Yes; AWV> TW
							Traditional Writing (TW): Two essays were written, edited and revised on a word processor published on paper.	
							AWV: Two writing prompts were composed through AWV on MAGpie software which were also edited and revised.	

<i>Prewriting</i>						
Flanagan & Bouck (2015)	RMD	54	8 th	E	GE; LD; ADHD	PB Prompts (PF Sheet)
					Three levels of PF in paper form supports developed from task analysis of high-quality essay writing. Sections to complete on the PF sheets include brainstorming, thesis statement, topic sentences, three supportive details per body paragraph, and concluding statement	
					First PF Sheet with most support: Most number of sections to complete (all).	
					Second PF Sheet with some support: Fewer number of sections to complete (2/3 of first PF)	
					Third PF Sheet with less support: Fewest number of sections to complete (2/3 of second PF)	
Graves et al. (1990)	Group	56	5 th -6 th	N	LD	PB (Cue Card) & Verbal Prompts
					Three groups all given a story starter with blank paper and instruction to plan a story before writing.	
					Control: Given story starter and time to plan only.	
					Story Grammar Cues (S): Given story starter, cue card with five story elements, and time to plan.	
					Story Grammar Cues + Characterization (SChar): Given story starter, cue cards with five story elements, verbal prompt to “think and feel just as people do,” and time to plan.	
Montague et al. (1991)	RMD	60	7 th -8 th	N	GE; LD	PB Prompts (Cue Card)
					Sixty students (40 with LD were selected and placed (20/group) in the following groups: normally achieving writing (NAW), story writing group (LDW) and story dictation group (LDD). All three groups wrote/dictated stories in the following conditions and were given unlimited time, blank and lined paper as well as a card with a story ending phrase:	
					Yes; NAW> LDW& LDD; LDD>L DW	

No Planning Time: Given story ender, blank and lined paper at the same time with the instruction that blank paper was for notes if they wish.

Planning Time Only: Given story ender, at least five minutes with a blank paper to plan before receiving line paper to write or dictate.

Planning Time + PF: Given story ender and PF cue card with story parts. The cue card was read, explained, reread, and directed students to use it to plan the story.

Process Writing Approach

Re et al. (2008)	Group	70	3 rd -5 th	N	ADHD	PB Prompts (Guide Scheme)	The students were tasked to write two letters with narrative about the personal lives Control: No support given for letter writing Treatment: Guide scheme facilitation - Chunked writing process into a series of steps and involved boxes to writing down ideas	Yes; Treatme nt> Control
Rowley & Meyer (2003)	Group	471	8 th -9 th	P; E	GE	EBD Prompts (Computer Tutor for Writers)	Computer Tutor for Writers (CTW) is a student-paced, teacher-guided software for writing that addresses student learning and achieves expert level of writing with fading prompts. Control: state-mandated writing curriculum Treatment: Three Groups: (1) 2+ class sessions, 2-6 hours of CTW, (3) 4+ class sessions, 6-11 hours of CTW,(3) 6+ class sessions, 11+hours of CTW	Yes; Group3 > Control; Group3 > Group1
Zellermayer et al. (1991)	Group	60	9 th -11 th 1	P; E	GE	EBD Prompts (Writing Partner)	Writing Partner (WP) is a software program with embedded prompts to guide students through prewriting, drafting, and revising phases of the writing process. All students were pre- and post-tested with a paper-pencil essay writing task.	Yes; USG> Control; USG>S G

Control group: Traditional word processor without prompts or other guidance.
Unsolicited Guidance (USG): In this version of WP, the prompts (i.e., guiding questions) were displayed automatically during the planning, writing and editing (parts or in whole) stages.
Solicited Guidance (SG): In this version of WP, the prompts (i.e., guiding questions) were only available during the writing, but not planning stage.

Direct Instruction							
Patterson et al. (2011)	Single Subject	2	5th	N	EBD	PB Prompts (Think Sheets) First 40 lessons of Expressive Writing1 (EW-1) were given to both students. Then they were to generate writing using the EW-1 strategy or EW-1+PF (PF were taught how to be used before the first EW-1 +PF session). PF given was a graphic organizer to help generate and organize ideas with the <i>IDEA</i> (mnemonic) think sheet.	No
White et al. (2014)	Group	29	7 th -8 th	E	EBD	PB Prompts (Think Sheet) Two groups of students were given EW-1 instruction over 11 weeks. Students in PF condition had one week (5 days) training on how to use the think sheet while the other group had unrelated reading instruction. Both groups were given 3 minutes to plan and 15 minutes to write during their daily exposition. EW: Given blank paper EW+PF: Given a think sheet the mnemonic, <i>IDEA</i>	No; But showed significant growth for both EW and EW+PF
Product Goals							
Graham et al. (1995)	Group	67	4 th -6 th	N	LD	Verbal Prompts Three groups for revising essays with goals.	Yes; AI>GG;

Page-Voth & Graham (1999)	Group	30	7 th -8 th	P	LD	PB (Checklist) & Verbal Prompts	Three groups wrote four essays on paper, had a one-on-one prewriting and postwriting conference. They were given feedback. Control: Wrote essays independently. At prewriting, spoke about how they were feeling. At postwriting conference, they read their essays out loud received three praises or general feedback. Goal Setting (GS): At prewriting, they were given an essay topic, selected and recorded writing goal. Then they shared how would achieve their goal. At postwriting conference, they read their essays out loud and given feedback Goal Setting + Strategy (GS+S): Same as GG; however, they used a six-step strategy checklist to plan how to achieve their goals	General Goal (GG): Students asked to “make it better” by thinking, making notes on the essay and rewriting. Add Information (AI): Generate at least 3 elements to make paper better and add information (e.g., description and/or details) then write notes and rewrite essay. AI + PF: At least five elements to add (with verbal prompts), evaluate elements and choose top 3, then write notes and rewrite essay.	AI+PF> GG
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Peer Assistance

Yarrow & Topping (2001)	Group	28	5 th -6 th	N	GE	PB Prompts (Flowchart)	Paired writing process system that consists of six steps outlined in a flow chart. It incorporates both metacognitive prompting and scaffolding for the interactive process. Pre- and post-test were a measure for both groups. No Interaction (NI): Independently wrote essays Interaction (I): Students are paired with one designated as the writer (tutee) and the other helper (tutor). The entire writing process is done collaboratively with a flow chart as a guide.	Yes; Posttest (both groups) > Pretest; Significance of I > NI
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Note. ¹ Age range reported was 13-15 years. However, there was a discrepancy within the article as the abstract states 9-11th graders while in the methods section states 9th and 6th graders; PF = procedural facilitation; RMD = Repeated Measures Design; MM = Mixed Methods; E = Expository; N = Narrative; P = Persuasive; GE = General Education; LD = Learning Disability; ID = Intellectual Disability; EBD = Emotional Behavioral Disorders; ADHD = Attention Deficit Hyperactivity Disorder; HH = Hard of Hearing; EBD = Computer-Based; WB = Web-Based; PB = Paper-Based; IB = Image-Based.

Literature Review Findings

The following section summarizes the findings of the literature review with a focus on participant characteristics, number of publications by year, research designs, treatment categories, use of procedural facilitation, and the significance of dependent variables and treatment.

Participant characteristics. The 18 studies had a total of 1,494 participants ($M = 83$; Median = 55; $SD = 107.76$). Fifteen studies (83%) explicitly stated that participants included students with disabilities including learning disabilities ($n = 10$), emotional/behavioral disorders ($n = 3$), ADHD ($n = 2$), intellectual disabilities ($n = 1$), and d/Deaf and hard of hearing ($n = 1$). Four articles (22%) had participants from only the general education population.

The demographic of participants from the group of 18 studies included students in upper elementary ($n = 8$; 44%), middle ($n = 7$; 39%), and high school ($n = 3$; 17%). There were significantly fewer studies with high school participants than those with upper elementary and middle school students. However, the total number of participants in each grade group were similar: upper elementary participants represented 30% ($n = 453$), middle school students 32% ($n = 479$), and high school students 38% ($n = 562$).

Number of publications by year. From 1990 to 2015, a 25-year span, 18 intervention studies were published in 13 different peer-reviewed journals on the use of procedural facilitation in student writing (see Figure 1 below). Six out of 18 studies (33%) were published between 1990 and 1995 with three of the articles published in

1991. Since then, between two and four studies have been consistently published in every five-year period. Since 1991, no more than one article has been published per year.

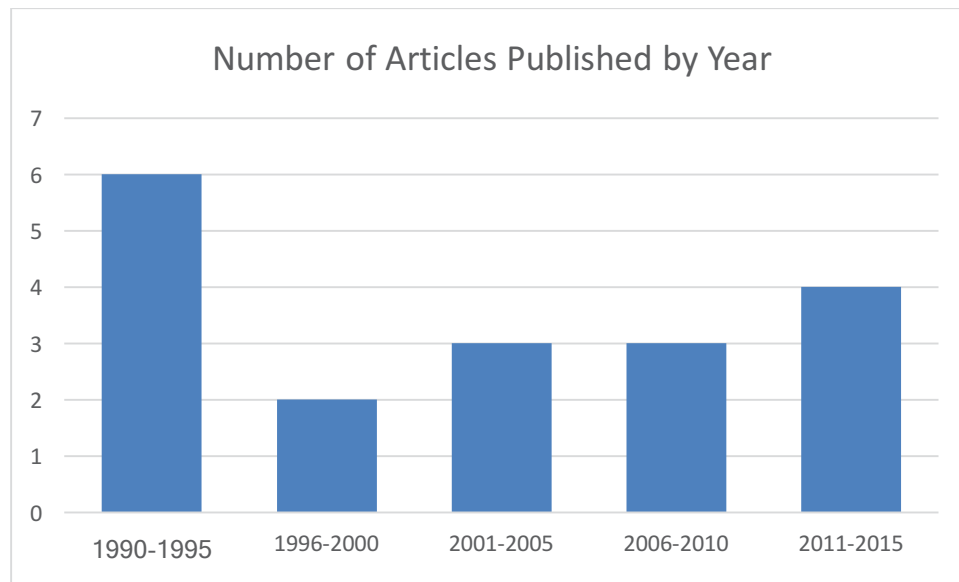


Figure 1. Number of studies published in five-year intervals from 1990 to 2015.

Research design. As mentioned above, one criterion for inclusion in this literature review was procedural facilitation explicitly stated as part of the intervention. As such, the articles were all quantitative in their design save for one, which used a mixed-method design with disaggregated quantitative results. The majority of the studies ($n = 12$; 67%) used group experimental design (i.e. true or quasi-experimental) with either a control or alternative treatment group. Five studies used repeated measures design (28%), and one used single-subject design (5%). In regards to the study utilizing single-subject design, it is worth noting that while the article (Patterson et al., 2011) purports the design to be single-subject, it only consists of two participants and does not

present the minimum of quality indicators necessary to be considered a valid intervention research (Horner et al., 2005).

Description of studies by treatment categories. The 18 studies were grouped into seven treatment categories, which were determined before coding. The categories were determined by previously published meta-analyses and reviews on writing and special education (i.e., Graham & Perin, 2007; Griffith et al., 2008). Although the meta-analysis by Graham and Perin (2007) listed procedural facilitation as a separate treatment category, for this current literature review, it is presumed that each treatment includes a component of procedural facilitation. Treatment categories used in the current review were as follows: strategy instruction ($n = 4$), alternate modes of composing ($n = 3$), prewriting ($n = 3$), process writing approach ($n = 3$), direct instruction ($n = 2$), product goals ($n=2$), and peer assistance ($n=1$).

Strategy instruction. Graham's (2006) meta-analysis on strategy instruction in writing describes strategy instruction (SI) as an explicit and systematic teaching of writing strategies and processes for pre-writing, revising, and/or editing. Strategy instruction, which includes a wide range of strategies across all genres of writing, teaches the independent use of the strategies by the students.

A study by Bonk and Reynolds (1992) examined the effects of generative prompts (*fluency, flexibility, originality, and elaboration*) and evaluative prompts (*relevancy, logic, assumptions, and conclusions*) on three dimensions of writing: content thinking, organization, and style/tone. Instruction of the strategies consisted of modeling (videotaped and live) and practice (at least 10-12 times) of reading, thinking, and

incorporating the prompts into writing. Prompts were eventually faded, and then posttests were conducted to determine if the students were able to apply the strategies without the prompts.

Bryson and Scardamalia (1996) compared two types of strategy instruction: strategies for reflective inquiry (SRI) and explicit structural knowledge (ESK). Both groups consisted of writing instruction that incorporated thought modeling and the use of software with built-in prompts. In the SRI group, the students were instructed in the use of eight strategies for reflective inquiry. These strategies included general problem construction and solving (*plan, identify confusions, and identify new learning*) and argument-based problem construction and solving (*build an argument, challenge its assumptions, elaborate statements, search for additional ideas, and put it together*). These strategies were delivered through the software MUSE (Monitoring Understanding + Strategic Execution).

The alternate treatment, ESK, used eight structural elements of sound and valid arguments, which were adapted from previous studies (i.e., Scardamalia & Paris, 1985; Toulmin, 1958). The elements include *beliefs for, beliefs against, reasons for, reasons against, facts, descriptions, examples, and conclusion*. These strategies were delivered through MyWord word processing software, which allows for minimal edits. Similar to MUSE, it also incorporated prompts that refer back to the elements taught and modeled. However, unlike MUSE, it provides minimal editing capabilities, and the prompts are not incorporated into the software but are available in a separate file.

Englert et al. (1991) implemented cognitive strategy instruction in writing (CSIW) to investigate its effect on the writing of students who were (1) high achieving, (2) low achieving, and (3) had learning disabilities. The intervention taught the POWER (*plan, organize, write, edit/editor, and revise*) strategy. This strategy involved the use of think sheets, which guided students to explicitly think through different parts of the writing process in four phases: text analysis, teacher modeling, student participation with class paper, and independent writing. The think sheets with the POWER strategy eventually faded, and post-tests were given to determine whether any generalizations could be made as to the effect of the strategy.

To support struggling writers in content areas, Scanlon et al. (2009) investigated strategy instruction with the use of graphic procedural facilitation. The students were taught skills associated with the mnemonic PROVE (**P**resent, **R**eveal, **O**ffer, **V**erify, and **E**xpress) in scaffolded instruction twice a week over six weeks. Instructions included the process of self-questioning to assess and organize knowledge to clearly express one's thinking to an audience in written form. PROVE prompts were eventually faded and post-tests were given to determine whether the PROVE strategy had lasting effects.

Alternate modes of composing. While the paper-based, handwritten form of writing has been the traditional method of composition in schools, there are alternative ways of writing, namely, the use of a word processor and dictation (Graham & Perin, 2005). The studies selected for inclusion in this review are those that incorporated student-produced compositions in alternate modes, which were then compared to the handwritten form of writing.

Englert, Wu, and Zhao (2005) and Englert et al. (2007) used an Internet-based program to facilitate students' writing in the treatment, whereas the students in the control were simply given a paper and pencil to compose their essays. The web-based program, Technology-Enhanced Learning Environment on the Web (TELE-Web), had customizable boxes with prompts for students to generate and organize ideas. Also, there were optional tools that the students had access to, such as text-to-speech and spell check. Although Englert et al.'s (2007) study was a replication of the study by Englert, Wu, and Zhao (2005), Englert et al.'s (2007) study only had one treatment group who had access to instruction, prompts, and optional tools. In contrast, Englert, Wu, and Zhao's study included two treatment groups with the second TELE-Web group given no instruction and prompts, and just a title box, a text box, and optional tools.

Strassman and O'Dell (2012) studied video captioning as a platform to aid in the writing process for students who are d/Deaf and hard of hearing. In their research, students participated in authoring with video (AWV) using the computer software, MAGpie. Students made AWV compositions, which integrate footage and/or images serving as a backdrop for students' written text, similar to that of closed-captioning. The participants of this study produced both handwritten compositions and AWVs that were then compared to assess the quality of the writing.

Prewriting. Interventions focused on prewriting included activities that students engage in before writing a formal draft. This may include identifying the topic, brainstorming to generate ideas and supports, and using concept maps to organize information.

Flanagan and Bouck (2015) studied the use of procedural facilitation sheets to support students with prewriting. The procedural facilitation sheets were developed from task analysis of high-quality essay writing. They provide three different levels of support with the highest having the greatest number of writing components (e.g., topic, thesis, etc.,) and the lowest having the least number of writing components to be completed by the students prior to the actual writing of the essays. The students participated in the three treatments and were tested accordingly. The results from all three treatments were compared to determine the greatest effectiveness.

A study by Graves, Montague, and Wong (1990) used story cues as a story starter for narrative writing. Students in the control group were given only a story starter and time to plan their writing. Students in the story grammar cues group (S) were given a story starter, a cue card with the five story elements, and time to plan. The experimental group, story grammar cues + characterization (SChar), was given the same as the students in the S group, but with the addition of verbal prompts to “think and feel” as the characters. S and SChar groups were compared to control for effectiveness.

Story enders were used as a prewriting exercise in Montague, Grave and Leavell’s (1991) study. Sixty students with learning disabilities were placed in one of the following groups: normally achieving writing (NAW), story writing group (LDW), and story dictation group (LDD). All three groups wrote/dictated stories in three different conditions. In the no planning time condition, students were simultaneously given a story ender for notes along with blank paper and lined paper for writing. In the planning time the only condition, students were given a story ender, and at least five minutes with the

blank paper to plan before receiving the lined paper for writing. Students in the final group, planning time + PF, were given a story ender; a cue card with story parts which were read, explained, and reread; and direction to use the cue cards in planning their story. The three groups were tested in all three conditions and results were compared.

Process writing approach. According to Graham and Perin (2005), the process writing approach consists of individualized support for the authentic practice of writing to “real audiences.” Students are highly involved and self-directed in their learning through multiple phases of the writing process that often include planning, drafting and revising.

The Computer for Tutor Writers (CTW) instructional strategy is described in Rowley and Meyer’s (2003) study as a “cognitive apprenticeship” through the process of writing with computer software (i.e., CTW). The CTW provides scaffolded writing lessons with multiple opportunities for practice. Students are instructed directly through software which guides them through creating goals; generating ideas through planning, writing, and revising; and finally publishing their writing with individualized supports which were determined through student progress by the program. Students were separated into three groups with varying amounts of exposure to the program. These groups were then compared to the control group, which had no interaction with the program.

Re, Caeran, and Cornoldi (2008) examined the use of guide schemes; a paper-based chunked writing process for personal letter writing that includes prompts to self-question that are presented in boxes. Students were tasked to write two letters with narratives of their personal lives. In addition to the guide scheme, the students were also

given opportunities to self-reflect on the writing experience at the conclusion of the intervention. Students in the control group were given the same topic with the simple direction to write and no additional supports. Treatment group scores were then compared to those of the control group.

Zellermayer and colleagues (1991) investigated the use of Writing Partner (WP) software, which incorporated embedded prompts during the planning, writing, and revision phases to guide students through the process of composing a well-developed essay. Two versions of the program were used in the two treatment groups. In the first version, the students were led through each step of the writing process without the ability to opt out of any of the prescribed prompts. The second version allowed for more student autonomy as they were able to determine for themselves whether to access the prompts during the writing phase. A control group wrote essays using the traditional form of word processing without prompts or any other guidance.

Direct instruction. Direct instruction (DI) is a teacher-led program that employs evidence-based practices to present complex concepts to students incrementally (Maglioaro, Lockee, & Burton, 2005). The method used in the two studies with DI was *Expressive Writing-1* (EW-1). This program is designed for students who are underachieving in writing. It includes instruction for quick and significant growth.

Studies by Patterson et al. (2011) and White et al. (2014) both evaluated the effect of the EW-1 program used in conjunction with procedural facilitators for students with EBD. Participants in both studies were given daily EW-1 instruction over an eight to 11 week period. Patterson et al. conducted the research using a single-subject design ($n = 2$)

with alternating treatments of EW-1 and EW-1 + procedural facilitation, which consisted of a mnemonic think sheet to help generate and organize ideas. Although the study done by White et al. (2014) was a replication of that done by Patterson et al., it had some differences. White and colleagues' study employed group design ($n = 29$) with the control group using the strategies learned in EW-1 instruction while the treatment group used those same strategies but with the addition of the mnemonic think sheets (used in the previous study). Comparison of the writing quality was analyzed between the EW-1 with and without the procedural facilitation (i.e. think sheets with the mnemonic).

Product goals. Goal setting is considered an essential part of the writing process. It is a characteristic of proficient writers which must be explicitly taught to emerging and struggling writers (Flower & Hayes, 1980). Product goal is a goal-setting activity that is specific to students' objectives for a final written product of a given assignment (Graham & Perin, 2005).

A study by Graham, MacArthur, and Schwartz (1995) investigated the use of goal setting in essay revision to assess its effect on revising behavior, and the quality and quantity of the essay content. Participants were placed into three groups. The first group involved general goal setting, where students were instructed to make their essays "better" by writing notes on their drafts and rewriting their essay. The second group was directed to generate and add at least three elements to improve their drafts, then write notes and rewrite their essays. The final group was directed to generate at least five elements to add, evaluate the elements, choose the best three to include in their essays,

and then write notes and rewrite their essay. The three groups were then compared on the length and the quality of the essays.

Page-Voth and Graham's (1999) study applied goal setting to the planning phase of essay writing. Participants were required to have one-on-one conferences before and after they wrote their essays. In the control group, students discussed their general feelings in their pre-writing consultation, and then they wrote their essays independently. During their post writing conferences, the students were given general feedback and/or praises. In the second group, students selected and recorded their writing goals on the topic, which was given during the prewriting conference. They were also directed to share how they would achieve their goals. These students were given feedback on their essays during their post writing conference specific to their writing goals. The final group engaged in all the activities of the second group. However, they were also given a six-step strategy checklist to the plan steps necessary to achieve their goals. All three conditions were compared for length and quality of essays.

Peer assistance. Yarrow and Toppings (2001) conducted a study that paired higher performing (tutor) and lower performing (tutee) students together to complete a personal writing assignment collaboratively. Paired students (i.e., the treatment group) were given a flow chart to structure and scaffold their writing process through metacognitive prompting (i.e., questions to ask themselves). Before the collaborative writing, the students in the treatment group were given instruction, which included modeling and repeated practice with their partners in assigned roles. The control group also received the instruction with the treatment group, and they were given temporary

partners for practice. However, with the writing assignment, they wrote their essays independently. The two groups were compared, within subjects (pre- and posttest) and between subjects (control and treatment) for significance of effect.

Use of procedural facilitation. In alignment with the purpose of this literature review, criteria for inclusion required a component of procedural facilitation as part of the intervention. Procedural facilitation is a type of prompting in the form of external support, outside the intervention, which enables students to develop ideas or supports, recall parts of the writing processes, and/or refine their writing. This external support/prompting is provided through paper-based and technology-based platforms.

Paper-based prompts. The most common platform that the studies used was the paper-based prompts alone ($n = 8$; 44%) or coupled with verbal prompts ($n = 2$; 11%), which accounts for over half of the studies included in this review ($n = 10$; 55%). However, the paper-based procedural facilitation prompts are diverse in their purpose, presentation, and term designated by the researchers.

Four out of the ten paper-based prompts were *think sheets* with mnemonic strategies (i.e., *PROVE*, *POWER*, and *IDEA*), which the students were instructed to use prior to implementation. The purpose of these think sheets was to aid students in memorizing the strategy to be applied when writing essays so that it can be applied independently. Two of the paper-based prompts were *cue cards*, which were given to the students. These included a list of story elements to support student recall when writing a narrative story. There was one study published for each of the following paper-based prompts: *worksheet*, *guide scheme*, *flowchart*, and *checklist*. The first two types require

student-produced content in the form of a worksheet and graphic organizer, while the latter two are tools to guide the students in drafting and refining their essays.

Computer-based prompts. Four studies (22%) used computer software to provide procedural facilitation prompts. This computer-based procedural facilitation presented prompts in question form to help students to think more deeply about the topic to produce more descriptive and developed writing. The programs used by the researchers include *WordPerfect*, *MUSE*, *MYWord*, *CTW*, and *Writing Partner*. Of these, *WordPerfect* and *MYWord* are word processing software that has been adapted to present prompts. *MUSE* and *Writing Partner* are programs that facilitate more interactive learning experiences for the students by providing customizable levels of support, and by incorporating boxes for text and graphics to increase user-friendliness. In addition to being highly interactive, *CTW* is a comprehensive writing instruction software that allows students to be self-directed while the program monitors student progress. This monitoring allows the program to determine student mastery as exhibited in the writing lessons, and then provide appropriate levels of instruction and support.

Other prompts. The final four studies provided procedural facilitation through either web-based prompts ($n = 2$), image-based prompts ($n = 1$), or solely through verbal prompts ($n = 1$). *TELE-Web* is similar to computer-based software programs in that there are interactive and engaging components that are customizable. In addition, being web-based affords the added flexibility of being available on any computer so long as it has Internet connectivity, as opposed to being restricted to only computers with the software installed.

One study by Graham et al. (1995) focused on verbal prompting, comparable to that of the think-out-loud strategy, to aid students through the process of revising. This use of images (moving and still) to trigger ideas to create more robust content, similar in form to the video captioning used in Strassman and O'Dell's (2012) study.

Significance of dependent variables and treatment. Although each study had its own unique set of dependent measures, one of the criteria for inclusion in this review was to report the holistic or quality of writing measure. There are various types of scales that are used to assess the overall quality of student writing, both preexisting scales and those constructed for the purpose of publication by the researchers. As part of the review of all 18 studies, the treatment and control scores for writing quality were analyzed and were determined to have statistical significance (i.e., $p < .05$), mixed results, or no significance (i.e., $p > .05$)

Statistically significant studies. Eleven out of 18 studies (61%) yielded statistically significant results for the measure of writing quality. These studies compared treatment groups with procedural facilitation to either alternative treatment or control groups. These include studies by Scanlon et al. (2009), Engler et al. (2005), Engler et al. (2007), Strassman and O'Dell (2012), Flanagan and Bouck (2015), Graves, Montague, and Wong (1990), Re, Caeran, and Cornoldi (2008), Rowley and Meyer (2003), Graham, MacArthur, and Schwartz (1995), and Page-Voth and Graham (1999).

Studies with mixed results. Four out of 18 studies (28%) yielded mixed results with a statistical significance of at least one measure, in a condition or group, which were either within subject measurement or between. Studies by Engler et al. (1991) and

Montague, Grave, and Leavell (1991) did not yield overall significance between the treatment and control group for the measure of writing quality; however, they found significance when data from students with LD was disaggregated. This may suggest that the intervention was appropriate for students with learning disabilities and not for typically achieving students.

The study by Bryson and Scardamalia (1996) compared two treatments with separate strategy instruction interventions, and computer-based procedural facilitation prompts. One treatment, SRI, yielded statistical significance both within and between for the measure of writing quality while the other treatment, ESK, yielded neither. This may be explained by the software utilized by ESK, which is a type of word processor with fewer interactive, engaging properties for students.

Zellermayer and colleagues (1991) used two versions of their intervention. One allowed students to have the option to use prompts while the other guided students through the complete writing process with programmed prompts. The results indicated that students in the group who were required to use prompts had statistically significant effects in writing quality over both the optional version and the control. The students with the choice to opt out of the prompts showed no difference from the control group.

In a peer-writing study by Yarrow and Topping (2001), all participants, paired and independent writers, had a statistical significance of writing quality from the pre- to posttest, but not between the two groups. Participants in both groups were all given the same instruction on the intervention including the modeling and practicing of paired

writing using a flowchart procedural facilitation. The pre-posttest significance of the control group may be attributed to the practice effect.

One study, which used a single-subject design (Patterson et al., 2011), can also be considered to have mixed results. Both participants in the study yielded a percentage of nonoverlapping data points (PND) of 75% for the measure of writing quality. The PND between the baseline and treatment calculates the percentage by finding data points in the treatment that are greater than the highest data point in the baseline over the total number of treatments (Scruggs, Mastropieri, & Casto, 1987). The PND ranges from 0-100% and its interpretation is as follows: < 50% was considered not reliable or effective, 50%-70% questionable, 70%-90% fairly or moderately effective, and > 90% highly effective (Scruggs & Mastropieri, 1998). While the study resulted in moderately effective PND, with only one data point per phase (baseline, two treatments, generalization, and maintenance), it did not meet the quality indicators to be considered a rigorous research study.

Not statistically significant studies. Two intervention studies (11%) were found not to be statistically significant in the writing quality measure. Bonk and Reynold (1992) used a word processing software, WordPerfect, as a platform for the treatment group in writing while the control group did not receive any additional supports. There was no statistical difference between the two groups in writing quality. The software consisted of basic text along with prompts, 26 questions the students were to ask themselves, which were outlined in a single document. This may have been

overwhelming for the treatment group, which can be a possible explanation for the lack of statistical difference.

The second study that was also not statistically significant in the measure was by White et al. (2014). While there was no statistical difference between the treatment group (EW-1 +PF) and the control group (EW-1), the intervention showed promise as the p-value was near significant ($p = .055$). The authors highlighted the uniqueness of the study as it was the first true experimental research conducted in a residential facility for students with EBD. They postulate that while they cannot claim that the intervention had significant effects, there is still value to the research and possible replication in a similar environment.

Implication For Students with Disabilities

Procedural facilitation was introduced more than three decades ago, and the research has continued consistently, albeit in small numbers. Research has been conducted on procedural facilitation using various formats and platforms involving students with and without disabilities. The results of the literature review indicate that with an appropriate platform, one that is visually and experientially engaging for the population (students with disabilities), procedural facilitation may be effective in supporting struggling writers, especially when it is coupled with interventions that utilize technology.

Although this review gave a general overview of the trends in research using procedural facilitation, an extension of this investigation may be useful in further determining the effects of procedural facilitation. By generating and comparing effect

sizes, quality of research, and the number of researchers involved in extending and/or replicating studies, it can be determined whether procedural facilitation may be considered an evidence-based practice as outlined by Cook, Tankersley, and Landrum (2009). This, in turn, may have strong implications for writing instruction, especially for students with disabilities.

Technology and Writing

There are numerous technology-based writing programs in multiple platforms (e.g., computers, tablets, smartphones) with embedded writing features (e.g., spell check, word prediction) to support all the components of the writing process – planning, composing and revising (Troia, 2014). According to the meta-analysis conducted by Goldberg, Russell, and Cook (2002), technology may be a useful tool in increasing the quality and quantity of writing. Their study, which included articles from 1992-2002, showed an effect size of 0.50 ($n = 14$) for the quantity of writing and an effect size of 0.41 ($n = 15$) for the quality of writing when technology was employed. Moreover, in Graham and Perin's (2007) meta-analysis on writing interventions for students with disabilities, the use of word processors was found to have a positive impact on student writing quality ($ES = 0.55$) and quantity ($ES = 0.79$). Although there has been an increase in research on the use of technology-based writing interventions for students with disabilities (e.g., Adkins & Gavin, 2012; Evmenova et al., 2016; Mason et al., 2011), more research is needed to fully make conclusions on its effectiveness (MacArthur, 2009).

Graphic organizers and technology. Graphic organizers are visual representations that connect ideas and information to allow abstract concepts to become more concrete by relating the information back to prior knowledge (Cochrane, 2010; Gajria et al., 2007; Kim, 2004). The use of graphic organizers has resulted in improvements in writing quality for students with disabilities. In a meta-analysis study on graphic organizers, Douglas and Hughes (2011) found that using graphic organizers with students with disabilities yielded a high effect size ($ES = 0.91$) in posttests across all studies and measures included in their analysis. With the proven effectiveness of graphic organizers and the proliferation of computer writing programs such as *Inspiration*® that facilitate their use (Smith & Okolo, 2013), more research into the use of technology-based graphic organizers is needed.

Ciullo and Reutebuch (2013) identified five writing interventions (Bahr et al., 1996; Englert et al., 2005, 2007; Sturm & Rankin-Erickson, 2002; Unzueta & Barbetta, 2012) in their meta-analysis of computer-based graphic organizers (CBGOs). These interventions yielded mixed outcomes with three (Englert et al., 2005, 2007; Sturm & Rankin-Erickson, 2002) resulting in significance over the control groups (paper-based and/or non-use of graphic organizer) and two (Bahr et al., 1996; Unzueta & Barbetta, 2012) with mixed results.

Due to the wide availability and accessibility of *Inspiration*® and *Kidspiration*® software, researchers are investigating the effectiveness of CBGOs generated by these programs. The use of *Inspiration*® and *Kidspiration*® as an intervention tool indicated improvements in the number of words written (Gonzalez-Ledo, 2012; Lin et al., 2004),

organization of the composition (Lorber, 2004), length of writing (Blair, Ormsbee, & Brandes, 2002), number of story elements (Gonzalez-Ledo, 2012), and minor differences in ideation (Lorenz, Green, & Brown, 2009).

More recently, Ponce, Meyer, and Lopez (2013) investigated the effect of a computer-based spatial learning strategy using a graphic organizer to support student reading comprehension and writing. The study included 2,468 fourth, sixth, and eighth graders in 69 classrooms across 12 schools in Chile. The schools were randomly assigned to a computer-based instruction group or a traditional instruction group to assess the impact of technology-based platforms in teaching language arts. For the writing intervention, the students were given scaffolded instruction on using graphic organizers first to plan and then articulate their ideas into compositions. The software used in the treatment was developed to align with the Chilean language arts standards for fourth, sixth, and eighth grades. The computer-based instruction was found effective as students in the treatment group not only had higher gains from pretest, but the differences in the gains were statistically significant.

Evmenova and colleagues (2016) investigated the use of the WeGotIt CBGO, which utilized *Microsoft Word®*, in a multiple-baseline single-subject study across three groups of 10 participants. The participants were middle school students with high-incidence disabilities (i.e., EBD, LD, ADHD, ASD) in a suburban school district outside a metropolitan city. WeGotIt is a comprehensive program with set lessons and a tool, the CBGO, that helps struggling writers to compose a well-developed one-paragraph persuasive essay. The researchers measured number of words, sentences, transition

words, essay parts, and holistic writing quality. Out of ten students, eight increased in the number of words, nine in the number of sentences, and all ten students increased in the number of parts, number of transition words, and holistic writing quality. The researchers also measured students' writing performance after the CBGO was taken away to assess whether or not the students were able to retain the strategies learned in the intervention. They found that five students increased in the number of words, seven in the number of sentences and transition words, and all ten increased in the number of parts and holistic writing quality.

Regan et al. (2017) also conducted a study using the WeGotIt CBGO with struggling students in a multiple-baseline single-subject design. The study took place in an urban, Title I school across three classrooms (the classrooms served as the three groups in the single-subject design): a general education classroom, a co-taught classroom, and a self-contained EBD classroom. Unlike the study by Evmenova et al. (2015), the teachers were provided with instruction on the WeGotIt program so they could perform the intervention. All three groups of students increased the average number of words, sentences, parts, transition words, and holistic writing quality in their writing for both treatment (i.e., with the CBGO) and maintenance (i.e., after the intervention, without the CBGO).

As shown in the studies above, the use of computer-based interventions for writing instruction is encouraging. However, mobile technology as a platform to teach writing is largely overlooked in research, despite its widespread use and potential to impact student learning (Gawelek, Komarny, and Spataro, 2011). Mobile technology is

especially appropriate for students with disabilities because it is easily personalized to accommodate individuals, and its interactive interface is more engaging for less motivated students (Sipe, 2013).

Mobile technology and writing instruction. Mobile technology refers to portable wireless devices that offer access to information, data, and applications (Coats et al., 2009). These include laptop computers, tablets, smartphones, e-book readers, and portable media players (Reychav, Dunaway, & Kobayashi, 2015). Due to their size, affordability, accessibility, personalization, and transportability, mobile devices are often preferred over personal computers (Alder & Fotheringham, 2012; Norris & Soloway, 2003; Vahey & Crawford, 2002). Among the different types of mobile technology, the iPad is considered to be especially suited for students in educational settings due to its user-friendly, intuitive platform (e.g., touch-screen, simple design, compactness) that provides diverse and interactive access to the curriculum (Cubelic & Larwin, 2014; Jaffarian, 2012). Furthermore, students are less likely to become distracted when learning from teachers who use iPads for instruction (Mango, 2015).

iPads and writing. Apple first introduced the iPad in April of 2010. Since then, it has been integrated into everyday use, faster than any other electronic device in history (Bakke, 2012). The sales to date are approximately 300 million iPads worldwide (Global Apple iPad Sales from 3rd Fiscal Quarter of 2010 to 4th Fiscal Quarter of 2016 (in million units), n.d.). iPads are a single unit system that features a touchscreen for navigating through programs, an on-screen keyboard for direct typing, and a built-in iOS operating system. The programs, i.e., software applications, are opened by touching

“app” icons, which are all housed on the “home” screen. They can be easily accessed by pressing the home button. iPads are ubiquitous devices that are compact and easy to use, which make them a worthwhile tool to support the learning of students with disabilities (Linder et al., 2013).

Although there is a growing amount of research conducted on the efficacy of iPad use in reading, studies on the effect of iPads on writing instruction are greatly lacking (Boeglin-Quintana & Donovan, 2013; Sessions, Kang, & Womack, 2016). The few studies that have investigated the use of iPads in writing involved the exploration of motivation and engagement (Pilkington, 2012; Sessions, Kang, & Womack, 2016), improvements in writing skills (Berninger et al., 2014; Dunn, 2014; Pilkington, 2012; Tanimoto et al., 2015, 2015), and the usage of iPads in the classroom (Frey, Fisher, & Lapp, 2015; Milman, Carson-Bancroft, & Vanden Googart, 2014).

Pilkington’s pilot study (2012) focused on elementary students and their use of iPads in homework assignments involving writing. In this qualitative study, Pilkington collected data from parents, student work samples, and observations of students’ iPad use. Pilkington concluded that using iPads increased student engagement, ownership of learning, and completion of at-home assignments. In addition, all the students except for one, who had multiple absences, increased their literacy scores.

Similarly, Sessions, Kang, and Womack (2016) qualitatively studied the effect of fifth graders’ use of multiple iPad apps for writing compared to the use of traditional implements (i.e., pens and pencils) for writing. Their research question was two-fold: to investigate the influence of iPad use (1) on the attitudes, behaviors, and social

interactions of students; and (2) on the quality of written composition. They found that the use of iPads in writing instruction resulted in more cohesive writing with greater details. Also, they also found that the use of iPads contributed a more positive social environment for the students.

Dunn (2014) conducted a mixed-method intervention study on the effect of the mnemonic strategy STORY (Start thinking about “W” questions, Think about your answers and illustrate, Organize and tell your story aloud, Revise your ideas and compose on paper, You can make edits and share it with others) using the iPad app *Doodle Buddy* (Pinger Inc., 2011). Using a single-subject design to collect quantitative data, Dunn found that six of the eight participants had highly effective results when comparing baseline to treatment phases for both written and spoken story data. In addition, the qualitative component (i.e., analysis of interviews) indicated that the students perceived the mnemonic to be helpful in composing better stories, and they felt they were more engaged and motivated in the writing activities.

Berninger, Nagy, Tanimoto, Thompson, and Abbott (2014) studied the effectiveness of iPad use on the instruction of spelling, handwriting, and syntax for fourth through ninth-grade students with language-based learning disabilities. The intervention consisted of the three lessons (Letters in Motion, Words in Motion, and Minds in Motion) in HAWK, a self-paced language program. The researchers analyzed handwriting, spelling, and written and oral syntax construction measures and found them to have significant improvements from pre- to post-test.

Milman and colleagues (2014) also conducted a mixed-methods study of the use of iPads in multiple content areas for students in pre-kindergarten through fourth grade. The researchers utilized surveys, interviews, and observations to examine teachers' and students' use, beliefs, and attitudes of iPads in the classroom. The results indicated that 80% of the teachers were able to differentiate instruction. Furthermore, it was noted that the third and fourth-grade teachers were able to use the iPad for students with disabilities to access reading and writing assignments. More specifically, Dragon Dictation®, a dictation software application, was used for writing assignments such as blogs, stories, reports, and presentations. Teachers also used the zoom features on the iPad to enlarge details of photographs to aid students in their writing assignments. Of the iPads that were used in writing instruction (8.8%) in the six classrooms observed, 51.7% of teachers reported seeing improvements in students' achievement, 20.7% showed no effect on students' achievement, and 27.6% reported no opportunities to observe student achievement.

Summary of Literature

With the increasing use of technology in writing instruction and support, a more diverse array of software delivery platforms is being explored. The widespread out-of-school use of portable technology (e.g., iPads and smartphones) is driving its increased integration in instructional settings. The use of these mobile devices in classrooms may be an effective strategy in minimizing the digital divide that many purports exists between school and home.

The need for writing interventions for students with EBD and the promising results of past studies of procedural facilitation merit more research on this topic. Writing is a multifaceted process that necessitates a systematic, evidence-based approach to instruction, especially for students with disabilities. This fact, coupled with the increasing use of mobile technology in schools and homes, indicates a need for more technology-based writing instruction in schools. This study aims to contribute more evidence to the insufficient body of literature on strategy instruction using mobile-based platforms.

Chapter Three

This chapter details the research methodology that was used to investigate the functional relation of a mobile-based graphic organizer (MGBO) with embedded procedural facilitation and persuasive essay writing. It includes the research design, setting, participants, materials, the independent variable, and the dependent variables. The chapter concludes with a description of collection procedures, data analysis, fidelity of treatment, and reliability.

Research Design

A multiple-baseline across participants design (Gast & Ledford, 2014) was used to conduct this study. The aim was to determine if there is a functional relation between an MGBO (with embedded self-regulated learning strategies and a procedural facilitation cue for ideation) on the persuasive writing performance of middle school students with learning and behavioral challenges. This design requires an intervention with repeated measures of the dependent variable that targets change in the specific academic or behavioral skills of a student (Alberto & Troutman, 2013). Single-subject, multiple-baseline design was appropriate for this study because the participants would not be able to unlearn the MBGO strategies or the procedural facilitation cues for generating ideas in their writing.

Multiple-baseline. Multiple baseline design is able to accommodate more than one measure of a dependent variable with multiple participants in a single setting. It examines the functional relation between the independent variable (i.e., the intervention)

and each of the dependent variables (i.e., the measures). The process of conducting a multiple-baseline study consists of three main phases (baselines, intervention, and maintenance) with multiple tiers (participants). First, according to Gast and Ledford (2014), at least five baseline data points must be collected from all participants simultaneously. When the dependent variables were stable in the baselines for the first participant, he was introduced to the intervention (i.e., the second phase), while the participants in other tiers continued with the baselines. Next, two participants in tier two started the intervention while the third tiered participant continued with the baseline. This staggered introduction continued until all tiers were in the intervention phase. During treatment, participants were provided the intervention and data was collected on the same dependent variables. Finally, when at least five data points were collected in the intervention phase, the participants were transitioned to the maintenance phase where they were measured again to assess where the skills learned were maintained.

Quality indicators. The study was designed to meet the high level of rigor for single-subject research outlined in the standards of *The What Works Clearinghouse* (WWC), Kratochwill et al. (2010), and the quality indicators identified by Horner and colleagues (2005). High level of rigor include: (a) a manipulation of the independent variable to assess the immediate and dramatic change between baseline and the intervention phase, (b) at least five points of data in each phase, (c) a clear presentation of data on a graph, (d) a minimum of two raters to measure dependent variables of at least 20% of the data collected with inter-observer agreement (IOA) of 80% or more, and (e) an analysis of the social validity of the intervention.

Institutional Review Board Approvals

Institutional Review Board (IRB) approval was obtained from George Mason University and the school district. The IRB was granted as part of a multiyear study funded by a federal grant (Appendix A). Parental consent and student assent were obtained prior to the implementation of the study. Consent forms (Appendix B) were distributed to students who were nominated by the school according to the inclusion and exclusion criteria signed by their parents. The researcher provided students with assent forms (Appendix B), read them out loud, and explained to students their voluntary participation in the study. Incentives that aligned with the school's daily point system were used to encourage the return of consent and assent forms.

Setting

The study was conducted at a public day middle school in a large, suburban Mid-Atlantic school district located outside a major metropolitan city in the United States. The school only services middle school students from across the district, grades seven and eight, who are identified as having one or more disabilities (e.g., emotional disability, learning disability, multiple disabilities, other health impairments, and autism) requiring significant emotional and/or behavioral supports. This placement is the most restrictive environment provided by the school system. The teams that develop the students' Individualized Education Programs (IEPs) determine the placement of students in the school.

The school provides an extensive behavioral support system including a multi-tiered Positive Behavioral Interventions and Supports (PBIS) program, behavioral

support staff, and on-site clinical faculty of school psychologists and social workers. Students are continuously supervised with full escort throughout the school until they reach the highest level of the PBIS at which time they are able to receive hall passes for use without supervision.

Demographics. At the time of the study, the school served 58 students, a number that was significantly lower than the two previous years at 81 and 96, respectively. There was a disproportionate representation of gender, with 24% female students ($n = 14$) and 76% male students ($n = 44$). The racial makeup of the school was as follows: Asian $n = 1$; 1.7%; Black $n = 10$, 17.2%; Hispanic $n = 14$; 24.1%; White $n = 29$, 50%; and Other $n = 4$, 6.9%. Of the 58 students, 30 (51.7%) qualified for free or reduced fee lunches.

Behavioral support. Students placed at the school present a variety of internalized and externalized behaviors that greatly affect their access to the curriculum. It was determined that less restrictive environments, such as co-taught or self-contained classrooms in a general education setting, did not provide enough educational support for these students. The students with internalized behaviors display depression and anxiety, often withdrawing from academic activities and peers, while the students with externalized behaviors show impulsivity, aggression, and disruptions, and are often unavailable to attend to instruction. When a student is in crisis at the school, the student may request to seek self-reflection time in the classroom and/or seek support from a clinical or behavioral staff member. If a student's behavior escalates to the degree that renders the classroom unsafe or distracts other students during instruction, the teacher may call the behavioral support staff member to escort the student out of the classroom

and into the crisis resource center (CRC). In CRC, the students sit in a small, separate room with a desk and a chair. They are able to continue with their studies, speak to clinical or behavioral staff, and/or may be required to complete a lesson or assessment related to their behaviors.

Social and emotional support. Students at the school are required to meet, as a group, with a clinical staff member and their homeroom classmates for emotional and social learning once a week. In addition, they receive one-to-one counseling with an assigned clinical faculty member according to their IEP service hours.

Academic. The curriculum provided by the school is aligned with grade-level school district programs of study and state standards. A licensed, or provisionally licensed, special education teacher and a paraprofessional provide the instruction in each academic and elective classroom.

Setting of the Intervention

The intervention took place either one-on-one or two-on-one (i.e., two students to one researcher), in multiple settings in the school depending on availability. These places included an empty classroom in a trailer near the main school building, empty classrooms in the main building, and a behavior specialist's office. On a few occasions, the intervention took place in the school media studio, the school cafeteria, and elective rooms that were not being used.

Participant Selection

Four seventh and eighth grade students from the school were selected as participants for the study. Administrators and English teachers from the school

nominated the student participants. These choices were based on the inclusion and exclusion criteria as well as the right fit, which was determined by considering the students' schedules and personalities. The following inclusion and exclusion criteria were applied in participant selection.

Criteria for inclusion. To be nominated for the study, the students must: (a) have been in seventh or eighth grade, (b) have received services with an individualized education program (IEP), (c) have eligibility on their IEP for one or more disabilities including emotional disability (ED) or have designated hours of services met in an ED setting, (d) have writing and behavioral goals on their IEP, (e) be able to write a basic sentence with a subject and verb as determined through teacher reports, (f) be able to access the general education curriculum, and (g) have a strong attendance record.

Criteria for exclusion. Students excluded from the study according to the set criteria included those who: (a) had a documented English language deficit as a speaker of another language as determined by Wisconsin, Delaware, Arkansas (WiDA) scores, English for Speakers of Other Languages (ESOL) services, etc., (b) were receiving a modified curriculum, and (c) presented significant behaviors including truancy that may have interfered with the instructional procedures of the study.

Participant Description

Six students were initially nominated to participate in the study and were to be separated into three groups. However, one student refused to participate during the baseline, and another did not return the consent form before the start of the study. The final section of participants included one-seventh grade and three eighth grade students,

all male. The average age of the students was 14.7 years. Their names have been changed for anonymity. An overview of the participants can be found in Table 1.

Chris, age 14.9, eighth grade, Caucasian male. Chris was eligible for special education services due to Autism and Speech and Language Impairment. He had been previously diagnosed with Autism, Reactive Attachment Disorder, Social Anxiety Disorder, Fetal Alcohol Syndrome, Learning Disabilities, Developmental Delays, and speech and language problems. Since fourth grade, Chris has failed all attempts at passing state standardized tests, including his fifth-grade writing test. He has a full-scale IQ score of 79 on the Wechsler Intelligence Scale for Children (4th ed. WISC IV; Wechsler, 2003) with subtest scores ranging from 70 to 96.

Behaviors. Chris's behaviors in his file were described as inconsistent willingness to follow teacher and staff directions across classes. He would often refuse to comply to directions during non-preferred tasks by ignoring teacher direction, putting his head down, leaving the classroom and/or becoming aggressive with peers and adults. In new or unexpected situations, he would become rigid and show his frustration by silence, pushing away papers, refusing socialization, leaving assigned areas, and crying. His IEP behavior goals included verbally expressing his frustration to a trusted adult, and following adult direction with no more than two prompts.

Writing. Chris's English teacher reported him not having a clear understanding of his writing abilities as he consistently refused writing assignments. On assignments that he only partially completed, he used basic skills that were below-grade level. While he expressed that he does not "like" the required steps of the writing process, his written

expression had previously benefited from the use of a graphic organizer, which was used to develop his ideas. His IEP writing goals included (1) using a graphic organizer to help him organize his ideas, and (2) writing essays of one or more paragraphs by completing all steps of the writing process.

Pre-assessment. Prior to the study, Chris was given a typing test on the iPad to determine his rate of typing. His gross word per minute (GWPM) was 4.6, his error rate was zero, and his net words per minute (NWPM) was 4.6. Chris's writing fluency in Woodcock-Johnson III (Woodcock, McGrew, & Mather, 2001) indicated a 5.3-grade equivalence. In the pre-intervention interview, he stated that he "hated writing" and "everything" about it. When asked to rate his confidence in writing a three-paragraph essay, he rated himself a "zero." He stated that he felt "nothing" could help him in writing because he "dislike[s] writing." However, when he had to write, he shared that he preferred to write on the computer instead of by hand.

Dan, age 14.6, eight grade, African American male. Dan was found eligible for special education services for ED, LD, and OHI. He had been previously diagnosed with Attachment Disorder, Attention Deficit Hyperactivity Disorder (ADHD), and Oppositional Defiant Disorder. Since fourth grade, Dan has failed all attempted state standardized tests, including his fifth-grade writing test. He has a full-scale IQ score of 94 on the WISC IV (Wechsler, 2003) with subtest scores ranging in the average range except for working memory, which was 76 and is considered very low.

Behaviors. Dan's behaviors were described as being easily distracted during instruction and independent work by peers and by things in or around his desk. He

needed many reminders during class to stay on task. Dan struggled with a very negative perception of self and presented with a negative self-esteem. He had difficulty with pro-social behaviors and tried to gain classmates' attention by initiating off-task behaviors, provoking or instigating peers, and being subtly defiant towards staff. While Dan had shown he wants to maintain positive relationships with peers, he would often exhibit excessive behaviors to be "cool" which reportedly annoyed them. His IEP behavior goals included being able to accept compliments from others, identify positive attributes of his actions, and express his feelings and thoughts to trusted adults.

Writing. Dan's English teacher reported that he had a tendency to rush through his work and made careless mistakes. He struggled to examine a topic carefully and convey ideas in his writing. Also, his writing often lacked descriptive details, a well-structured sequence, cohesion, and organization. He used short, basic sentences in his writing. Dan's IEP writing goals included increasing his score to 80% on a teacher-made rubric when writing an essay.

Pre-assessment. Before the study, Dan was given a typing test on the iPad to determine his rate of typing. His gross word per minute (GWPM) was 13.2, his error rate was 2, and his net words per minute (NWPM) was 11.2. Dan's writing fluency (Woodcock, McGrew, & Mather, 2001) indicated to be a 5.7-grade equivalence. In the pre-intervention interview, he stated he had ambivalent feelings about it. When asked what he thinks of writing, he replied, "I don't know." He rated his confidence in writing a three-paragraph essay as a "Like negative two. Like really bad." He stated that being

taught “how to do it,” or the process of how to write, would help in his writing. Dan also liked to write both with paper and pencil and on the computer.

Nate, age 14.3, eighth grade, Hispanic male. Nate was found eligible for special education services for ED and LD. While specific disorders were not reported, he was found eligible for ED when he had to be moved to an alternative learning school in kindergarten due to his severe behaviors. Although Nate spoke both Spanish and English at home, it was determined by the school that his dominant language was English and that he not receive English for Speakers of Other Languages (ESOL) services. Since 4th grade, Nate has failed all attempted state standardized tests. His 5th-grade writing test was not scored. He has a full-scale IQ score of 96 on the WISC IV (Wechsler, 2003).

Behaviors. Nate’s behaviors were described as being erratic with constant cursing, yelling, name-calling to adults and peers, and verbally and physically aggressive. On multiple occasions, he has punched and kicked school property (e.g., lockers). He has been rude, condescending, and defiant to adults in the school. Nate had easily become upset by seemingly minor events and not getting his way. In the past, he had also targeted specific students by bullying and harassing them. His IEP behavior goal included following adult instructions and using his coping strategies to refrain from huffing, sighing, rolling his eyes, arguing, hitting walls, leaving a location without approval, and refusing to move from the location.

Writing. Nate was reported to “hate” writing. Moreover, when given a writing assignment, he struggled with the transition of his thoughts and ideas into written composition even with the aid of graphic organizers. He had difficulty writing a three-

paragraph essay using a variety of sentences and with varying complexity. He lacked writing with a wide array of vocabulary and failed to demonstrate cohesion in his thoughts. His IEP writing goals included writing a three-paragraph essay and increasing his score to 75% on a teacher-made rubric when writing with technology.

Pre-assessment. Prior to the study, Nate was given a typing test on the iPad to determine his rate of typing. His gross word per minute (GWPM) was 21, his error rate was 4, and his net words per minute (NWPM) was 17. Nate's writing fluency (Woodcock, McGrew, & Mather, 2001) indicated to be a 5.3-grade equivalence. In the pre-intervention interview, Nate stated that he found writing "boring" and a "waste of my time." When asked to rate his confidence in writing a three-paragraph essay, he replied that it depends on the topic, but in general, rated himself a "two." He felt learning about "not running out of ideas" would help him in his writing. In general, he preferred to write with a computer, rather than by hand.

Keith, age 15, 7th grade, African American male. Keith was found eligible for special education services for ED and LD. He had been previously diagnosed with Fetal Alcohol Syndrome. He had been retained in 4th and 6th grade. Since 4th grade, Keith has failed all attempted state standardized tests. His 5th-grade writing test was not scored. Keith's Composite Intelligence Index on the Reynolds Intellectual Assessment Scales (RIAS; Reynolds & Kamphaus, 2003) was unable to be calculated due to a significant discrepancy in results. His Verbal Intelligence Index score was 94 (average), and Non-verbal Intelligence Index was 58 (significantly below average).

Behaviors. Keith was described in his IEP as having limited insight on how his behaviors impact others which led to blaming of others and having difficulty with conflict resolution. He has shown a tendency to misread social cues that result in becoming argumentative, defensive, and aggressive. He displayed a very low frustration tolerance, especially with non-preferred activities and adults. Keith was also described as being easily distracted during transitions and in unstructured environments and at the time refusing to follow adult directions. He was reported as having difficulty with self-control, not understanding when to joke and when to be serious. His behaviors had escalated to the point of being removed from class and were documented to have been out of class 332 minutes in September for a behavioral and clinical reason. His IEP behavior goals included verbally asking for a break to calm himself then to return to work instead of yelling and having to be removed from class, and following adult direction with no more than two prompts with appropriate tone, language, and volume (i.e. without yelling, name-calling, or using insults directed towards the teacher or his peers).

Writing. Keith's English teacher reported that he wrote minimally and struggled with even basic sentences. Although he was able to express his thoughts verbally, he had great difficulty with the written form. He did not understand verb agreement and regularly misused all aspects of grammar, punctuation, and capitalization. In addition, he showed no logical flow of ideas and had not demonstrated being able to use a graphic organizer. His IEP writing goals included being able to construct a simple sentence with correct capitalization, punctuation, and subject-verb agreement with and without the use of technology.

Pre-assessment. Prior to the study, Keith was given a typing test on the iPad to determine his rate of typing. His gross word per minute (GWPM) was 13.6, his error rate was 5, and his net words per minute (NWPM) was 8.6. Keith’s writing fluency (Woodcock, McGrew, & Mather, 2001) indicated to be a 5.3-grade equivalence. In the pre-intervention interview, he stated that writing “can be frustrating” for him especially when he is unable to understand the assignment. When asked to rate his confidence in writing a three-paragraph essay, he replied he felt he could “do it” and rated himself an “eighth.” Keith shared that learning how to plan would help his writing. And when he has to write, he prefers to write on the computer instead of by hand.

Table 4

Participant Demographic Information

Participant	Age	Ethnicity	Disability	Gender	IQ	WF	NWPM
Chris	14.9	C	Autism OHI	M	79	5.3	4.6
Dan	14.6	AA	ED LD OHI	M	94	5.7	11.2
Nate	14.3	H	ED LD	M	96	5.3	17
Keith	15	AA	ED LD	M	N/A	5.3	8.6

Note. C = Caucasian; AA = African American; H = Hispanic, OHI = Other health impairment; ED = Emotional disability; LD = Learning disabilities; IQ = Intellectual Quotient reported in participants’ educational records; N/A = Was unable to calculate due to significant discrepancy in the verbal and nonverbal index; WF = Woodcock Johnson writing fluency grade equivalence; NWPM = Net words per minute.

Implementer

The researcher leading the study served as the instructor of the intervention for all participants. She had a master's degree in special education and a K-12 teaching license in mild disabilities special education. She had also worked as a classroom teacher for five-years teaching middle schools students with emotional and behavioral disorders at a public day school. The researcher had Project WeGotIt instructional experience from previous research studies.

Independent Variable

This study consisted of a persuasive writing intervention with four main components: a mobile-based graphic organizer, procedural facilitation cues for ideation, the *IDEAS* mnemonic strategy, and five corresponding lessons. Each component is briefly described below.

Mobile-based graphic organizer. The MBGO is an iPad application developed for Project WeGotIt, though not yet available through the Apple App Store. It is displayed in two screens: the first screen requires the drafting of the paragraph, then when completion is indicated at the bottom of the page, the second screen automatically populates with prompts for editing and evaluation (Appendix C). These two main screens are further broken down into five components. Students begin by filling out their names on the MBGO and are then read two persuasive essay prompts. They select only one prompt to respond to in writing. Prompts from the previous study by Evmenova et al. (2016) were provided to the students. Examples of the prompts include “write an essay

on whether or not students should go to school on Saturdays” and “write an essay on whether or not schools should be separate for girls and boys.”

There are five major parts to the MBGO. Each is described below and can be found in Appendix C.

Pick your goal (part one). After writing his or her name, the user is prompted to choose a writing goal. A drop-down menu provides options: *I will include 3 reasons and 3 examples, I will include 3 reasons and 2 examples, or I will include 3 reasons and 1 example.* When a goal is selected, the students are able to access the brainstorm section of the MBGO.

Fill in the chart (part two). In the *brainstorm* section of the MBGO, the user is given a choice to check which one of the two prompts he/she has chosen to answer. When a check is placed, the procedural facilitation cues – “does it change your...” is unlocked for the student to select one at a time. Choosing one of the cues then unlocks the Main Points column of “Determine 1st reason.” There, the user is to type a short phrase that indicates a reason that corresponds to the first checked box of the procedural facilitation cue. For example, if the prompt is *Write an essay on whether or not students should be allowed to chew gum in school*, the user may check “environment” and the main point for the first reason can be *make the classroom dirty*. This repeats until all three reasons are written in the Main Points column, at which time the sentence boxes are unlocked for the user to compose at least one example for each reason using full sentences.

After all parts of the Main Points column are complete, the user fills out the Sentences column. At the start of each sentence, a drop-down menu is available for the selection of a transition word. As each part of the Sentences column is completed, the “check your work” column is automatically checked and is available for the user to determine whether or not each selection includes complete sentences that end in a period.

Copy the text (part three). When all the requirements are fulfilled in the first two parts of the MBGO, the user is then given the option to press the “copy” button located at the bottom of the page. Pressing this button transitions the user to the next screen for the final two parts. If all parts of the graphic organizer are completed, a pop-up on the screen indicates *Your goal is met! You can copy now.* If an element is missing, for example, a period at the end of a sentence, a pop-up says *Goal is not met! Please go back and make changes.*

Read your essay (part four). In this part, a compilation of all the written sentences from the previous page is presented in a paragraph format. The user has the option to read silently and make edits to his/her paragraph or to use the text-to-speech function on the MBGO to have it read out loud before manually editing.

Evaluate (part five). After making final edits, the user answers the following questions: (a) How many words do I have in my essay? (b) How many sentences do I have in my essay? (c) How many reasons do I have in my essay? (d) How many examples do I have in my essay? And (e) do all my sentences make sense? The next question, *How do I feel about my essay* is followed by three clickable faces – happy, neutral, and sad. After that, the user chooses his/her next writing goal from a drop-down

menu that is identical to the one seen under Goal Setting. Finally, the user has the opportunity to give the essay to a peer or teacher for feedback. In the feedback section, the sentence reads, “*You have included blank in your essay, which makes you a great writer!*” After identifying at least one positive characteristic, the person giving the feedback inserts this characteristic in the ‘blank.’

After completion of the five parts, four options are presented as simple buttons – Email, Print, Preview, and Start Over. The students are able to email their essays to their teachers or themselves, print out their essays to keep as hardcopies, or preview the PDF files of their essays, which can be saved on the Google Drive.

Other supports. It is also worth noting that on the first screen of the MBGO there are multiple yellow light bulbs, which, when selected, serve as additional supports for users who are unsure of what to do in each part. For example, if the “Identify your Opinion” box in the MBGO is clicked, a pop-up message, *What do you think about the topic?* Appears at the top to remind the user of the mnemonic. When a lightbulb is clicked, a recorded voice explains the purpose of the section and what the student is expected to write in it.

Procedural facilitation. To generate relevant ideas to support their opinions about a topic, students were instructed on the use procedural facilitation cues when writing a persuasive paragraph. After students were presented with the choice of two prompts, they selected one to respond to in writing. To support their ideation, they were then prompted with procedural facilitation cues. These cues were seven self-questioning reminders – “*How does it change Your mind? Your feelings? Your money? Your*

body? Your relationships? Your environment? Your time?” These reminders were embedded in the brainstorming section of the MBGO.

IDEAS mnemonic. The mnemonic, IDEAS, is a strategy that was developed as part of Project WeGotIT! which uses a technology-based intervention to support struggling writers (Evmenova & Regan, 2012). The mnemonic is included as part of this intervention to support students’ recall of the different components that make up a persuasive paragraph. IDEAS stands for Identify your opinion, Determine three reasons, Elaborate with examples, Add transition words, and Summarize your opinion. This mnemonic was introduced during instruction and is part of the MBGO.

Lessons. The five lessons used in the intervention address the structure of a persuasive essay using the IDEAS mnemonic, idea generation with procedural facilitation cues, and the use of the MBGO. Lesson 1 introduced the IDEAS mnemonic with a focus on the relationship between an opinion, reasons, and examples. Lesson 2 presented the procedural facilitation cues with modeled and independent practice of its use in generating ideas. Lesson 3 was a step-by-step modeled practice of the MBGO. Lesson 4 gave the students the opportunity to practice using the MBGO independently while the researcher assessed the mastery of the students’ usage. Lesson 5 came after the students had the chance to independently write their essays using the MBGO in the treatment phase. In Lesson 5, the students were taught to use the strategies from the MBGO (i.e., the IDEAS mnemonic and procedural facilitation cues), without the actual MBGO. A more detailed description of the lessons can be found in the procedure section of this chapter.

Instructional Materials

This section outlines the materials used by the researcher and the students during the study. The researcher had a binder containing paper copies of all the necessary materials, along with electronic copies of the materials on her iPad and a flash drive. The student materials were provided to them in folders, which were kept by the researcher.

Researcher materials. During each session, the researcher had all of the materials needed for instruction and practice. This included the five lesson plans and corresponding PowerPoint presentations for each lesson, copies of student materials, an attendance sheet, a fidelity checklist of procedures for each session, interview protocols, and a mastery checklist to assess the students' ability to use the MBGO independently and consistently.

Lesson plans. The five lesson plans were developed using the LEARN format. This format is specific to the school district where the school is located. The format, *LEARN*, stands for Link, Engage and educate, Active learning, Reflect, and Now and then (Appendix D). First, each lesson began with “linking” or connecting the agenda with the previous lesson and/or background knowledge. This allowed for students to activate information they already had so they could build upon their learning during the lesson. Then, the researcher “engaged and educated the students with explicit instruction in a focused lesson. Next, students “actively learned” through independent practice. Students then “reflected” on their work by sharing with others or with the researcher. Finally, the researcher connected what they learned “now” to what they would learn next time. A researcher-led PowerPoint presentation guided each lesson except Lesson Five

which did not have an accompanying PowerPoint. Each lesson consisted of a student agenda with a checklist to show progress through each part of the lesson. The parts of the lesson were presented through pictures and animations.

Fidelity checklist. For baseline, treatment, and maintenance phases, the fidelity checklist included turning the video camera on, following the instructional protocol, and saving data. Instructional implementation checklists were completed for each lesson and included lesson specific items to be checked off. Fidelity checklists can be found in Appendix E.

Mastery checklist. A mastery checklist was used to assess students' understanding of the MBGO (Appendix F). This helped determine if students were able to transition to the treatment phase. The mastery checklist was completed by the researcher at the end of the first four lessons. The researcher completed the checklist by observing each participant independently using all of the MBGO features accurately. If needed, a review of the lessons and/or MBGO features was provided in subsequent sessions until all the items in the checklists were met.

Student materials. During the instruction phase, students received a folder with materials needed for their participation in the study. This included a hard copy of each lesson's agenda and materials that were specific to each lesson.

Agendas. Each lesson had an agenda, which stated the purpose of the lesson at the top. Below the purpose was a checklist of all the different parts of the lesson. These items, also presented in the teacher's PowerPoint presentation, were checked by students as they progressed through the lessons.

Lesson materials. Students received printed materials, specific to each lesson, that they were required to follow along with and/or complete. These included warm-ups, guided practice, independent practice, and/or an exit ticket.

Other materials. Other paper-based materials that were used during the study included student interview protocols for pre- and post-intervention and a writing fluency sub-test of the Woodcock-Johnson II Tests of Achievement (WCJ II) for students' pre-assessment. Technological equipment required for the study were student iPads for writing with the MBGO, a researcher iPad for PowerPoint presentations and data collection (voice recording for interviews), and video cameras to record and check for fidelity.

Dependent Variables

The following dependent variables were measured: number of words, number of sentences, number of transition words, functional essay elements, coherence, and holistic writing quality. In addition, data was collected from the observation of the use of procedural cues and student interviews for social validity. See Table 5 for research questions and their corresponding dependent variable(s) and tools.

Number of words. The number of words was counted as every letter or combination of letters with one space before and one after. All words had to contain at least one vowel but otherwise were not discounted in cases of spelling inaccuracy.

Number of sentences. The number of sentences was measured by counting the construction of basic sentences that contained a subject, a verb, and ended with correct

punctuation. The inclusion of other grammatical and/or syntactical mistakes did not affect the counting of the total number of sentences.

Number of transition words. A word (or phrase) at the beginning of a sentence that represented a transition of thoughts or a connection to ideas from a previous sentence was counted as a transition word. These words and phrases include, but were not limited to, *for example, to illustrate, therefore, also, first, in addition, in conclusion*, and all of the transition words provided in the dropdown menu of the MBGO.

Functional essay elements. As described by Scardamalia, Bereiter, and Goelman (1982) and as used in previous writing studies (e.g., De La Paz, 2001; Graham, 1990; Page-Voth & Graham, 1999), functional essay elements were counted to investigate the content or ideas of the essays. Functional essay elements are units that are relevant and directly support the writer's argument. These include a position, reasons for supporting or refuting the position, elaborations or examples on the support or refutation, and a conclusion. Nonfunctional essay elements include information that is not relevant to the topic, repeated information, and/or unintelligible as discerned by the scorers. The functional essay elements are a part of the IDEAS strategy, and the students were instructed on these components as part of the lessons in the intervention. These elements were counted by separating the essays into smaller units and classifying them as either functional or nonfunctional. A more detailed description of the functional and non-functional elements can be found in Appendix H.

Coherence. Based on procedures by Scardamalia, Bereiter, and Goelman (1982), and used by Graham (1990), coherence was measured by examining the longest

connected units of functional essay elements as described above. Coherence measures the logical sequence of relevant ideas in an essay. The ordering of units that was considered coherent included a statement of position on the topic followed by a supporting reason that directly related to the position and a statement of reason followed by a relevant elaboration or example of the reason. Scoring of coherence was as follows: -1 for no functional element, 0 for one functional element, and +1 for each functional essay element unit of the longest string in the essay. The lowest score possible for coherence is -1, and has no pre-determined highest score as it depends on the length of the essay. A noted difference between the coherence scoring of this study and the scoring as described by Scardamalia, Bereiter, and Goelman (1982) was the use of repeated ideas. In the current study, a repeated unit of an idea, while neither counted as a functional essay element nor as a part of the coherence sequence, was not a string ender like other non-functional essay elements. The participants, being struggling writers, may not have the sophistication to refrain from repeating information which may affect the coherent string to the degree that the score would not reflect their true progress. A more detailed description of coherence scoring can be found in Appendix I.

Holistic writing quality. Holistic scoring is an evaluation of the quality of the entire written text that designates a value to the writing from a set of criteria that had been established before the actual scoring (Charney, 1984). The holistic writing quality rubric in the study was used previously by Evmenova et al. (2016) and Regan et al. (2017) for scoring persuasive essays of students who used the WeGotIt CBGO with embedded self-regulated learning strategies. The essays were scored on a 0 to 9 scale

with 0 representing the lowest quality of writing and 8 the highest. The rubric examined the overall quality of the writing. It took into account the inclusion of components of a well-written persuasive essay including the number of essay parts, discrete sentences, and use of transition words. A score of 0 was awarded for essays with no or unintelligible responses. See Appendix J for a more detailed description of each score.

Procedural facilitation usage. To understand how the students used the procedural facilitation cues, the researcher maintained an observation sheet that collected descriptive data on which cues were selected, in what order, and whether they related to the reason given. Narrative data was also collected as the researcher noted the incidental and general use of the cues. Google Forms allowed for quick and easy input of data which were then organized in an Excel spreadsheet.

Social validity interviews. Students were interviewed before the start of and at the conclusion of the study. The pre-intervention interviews were semi-structured and included an eight-item protocol. Questions asked elicited each students' preference and experience using technology, their experience with writing, and any experiences using technology for writing (Appendix K). The post-interview followed a semi-structured protocol with 22 questions. These questions were used to elicit student perceptions of the different parts of the MBGO, the specific components of the intervention including the lessons, the IDEA strategy, and the use of the procedural facilitation cues for ideation (Appendix K).

Table 5.

Summary of the Research Questions and Measures

Research Questions	Dependent Variable(s)	Tools
1. Is there a functional relation between using a mobile-based graphic organizer with embedded procedural facilitators and improvements in the number of words, sentences and transition words of persuasive writing for middle school students with emotional and behavioral disorders?	Holistic Writing Quality	Holistic Writing Quality Rubric (Evmenova et al., 2016; Regan et al., 2017)
	Number of Words	Def: A letter or combination of letters with one space before and one after. Must include a vowel, but will not discriminate for spelling accuracy.
	Number of Sentences	Def: Construction of a basic sentence with a subject, a verb, and end with correct punctuation. Will not discriminate for grammatical and/or syntactical accuracy.
	Number of Transition Words	Def: A word or phrase at the beginning of a sentence that represents a transition of thoughts or connects ideas from a previous sentence.

2. Is there a functional relation between using a mobile-based graphic organizer with embedded procedural facilitators and improvements in the essay elements and coherence of persuasive writing for middle school students with emotional and behavioral disorders?	Essay Elements	Guidelines for Determining Essay Elements Sheet to count the total number of functional essay elements.
	Coherence	Coherence Evaluation Sheet to determine the longest coherent string.
3. Is there a functional relation between using a mobile-based graphic organizer with embedded procedural facilitators and improvements in the holistic quality of persuasive writing for middle school students with emotional and behavioral disorders?	Holistic Writing Quality	Holistic Writing Quality Rubric (Evmenova et al., 2016; Regan et al., 2017)
4. Do middle school students with emotional and behavioral disorders maintain the number of words, sentences, transition words, holistic quality, functional elements and coherence in persuasive writing when a mobile-based graphic organizer is no longer available to them?	See above: Research Questions #1-3	See above: Research Questions #1-3
5. How do middle school students with emotional and behavioral disorders use the embedded procedural facilitation features in the brainstorming component when independently completing the mobile-based graphic organizer to write a persuasive essay?		Procedural Facilitation Observational Sheet (Google Form)
		Post-intervention Interview Protocol

Research Procedures

There were multiple phases of research procedures for the study, which included pre-assessment, baseline data, intervention instruction, treatment, instruction on maintenance, and maintenance data. The research study transpired over five weeks in 20, 45 to 50 minute sessions, which took place during each student's English class period at school. Fifteen of the 20 sessions were used for data collection, and five were devoted to instruction. To account for fatigue of writing, baseline, treatment and maintenance were given once a day unless a makeup session had to be administered due to an absence or field trip. The makeups occurred at a different time of the day with at least three school periods between the makeup period and their English period. See Table 6 for an overview of the timeline.

Pre-assessment procedures. Prior to the start of the study, students participated in three pre-assessments. These included the writing fluency sub-test of the Woodcock-Johnson III (Woodcock, McGrew, & Mather, 2001), a one-minute typing test, and a pre-intervention interview that lasted less than 10 minutes. The writing fluency component of Woodcock-Johnson is a timed test that measures sentence structure with picture and/or word prompts. The typing test measured students' typing ability by speed and accuracy within a one-minute period (Appendix L). Gross words per minute (total words typed within a minute), error rate (number of errors within a minute), and net words per minute (gross words per minute minus error rate), were calculated. The number of gross words per minute was calculated by counting the total number of typed entries (including all characters, spaces, and punctuation) divided by 5 to avoid discriminating on the length of

the words typed. Finally, an audio-recorded pre-intervention interview was conducted with participating students and later transcribed. The researcher administered each of these pre-assessments.

Baseline phase. During baseline, students were given a choice of two writing prompts presented on the document in their respective folder in the researcher's Google Drive. They were able to access these on the iPad through the Google Drive app. The baseline prompts were persuasive essay prompts, validated from previous research, for students to express their opinions. An example of one of the prompts is, "Write an essay on whether or not students should wear uniforms to school." A baseline testing protocol (Appendix M) was read out loud by the researcher, and the students were given 30 minutes to complete their typed response on the iPad. No writing assistance, including ideation, grammar, punctuation, and spelling, was given to the students. However, the researcher did support students if they had technical issues with the iPad. There were five baseline sessions for Chris, six for Nate and Dan, and seven for Keith.

Instructional phase. The instructional phase consisted of four lessons used to instruct the students on the different components of the persuasive paragraph, self-question procedural facilitation cues, and the use of the MBGO. Each lesson took place in one session for each student, except Keith and Chris, who had to finish Lesson 3 instruction before the start of Lesson 4's session.

Lesson 1. The objective of the LEARN model Lesson 1 (Appendix N) was for students to be able to understand and recall the different components of a persuasive paragraph using the strategy IDEAS, and know how the different components (i.e.,

opinion, reasons and examples) relate to one another. A PowerPoint presentation was used to guide students through the lesson. The lesson began with *Link*. This five-minute introduction to the lesson presented the purpose of the session and gave an overview of the lesson using the agenda. To stimulate background knowledge of persuasion, an advertisement from a magazine was shown to students. The following questions were discussed: (1) *What is the ad trying to convince you to do?* (2) *Why do you think you should buy this?* and (3) *What's the example they give you as to why you need to buy it?* These questions started the discussion of the relationships between opinion, reason, and example.

There were two focus lesson components (part of *E* in the LEARN model) to Lesson 1 with *Engage and education, Active learning, and Reflect* of the LEARN model. The first focus of the lesson was on the relationship between opinions, reasons, and examples in persuasive essays. A graphic of an upside-down pyramid was presented to indicate (1) they are all related and should be relevant to each other, and (2) the opinion expressed is a larger idea which is supported by a reason (smaller idea) which is further elaborated by an example (smallest idea). The researcher modeled the concept by generating an opinion, reasons, and examples from a given prompt. Then students practiced, with support from the researcher if needed, on their worksheet. The students then shared their practice worksheets with the other the student (if any) and the teacher.

The second focus component of the lesson introduced the students to the strategy *IDEAS*. This was to help students remember the different parts, especially identifying opinions, determining reasons, and elaborating with examples. The students also learned

to add transition words (fulfilling the A component in IDEAS) and summarize (fulfilling the S). The students were required to write down the parts of *IDEAS* on their own papers to reinforce their learning. The MBGO highlighted the IDEAS strategy with the corresponding colors of the opinions, reasons, and examples tasks from the first focus lesson. The researcher modeled the use of the IDEAS strategy in the MBGO using a sample prompt. The students then had the opportunity to practice on their own and share their work.

The *Now and then* component of the lesson plan consisted of identifying parts of IDEAS in an example paragraph. The students were required to place the parts in the order of how a persuasive essay paragraph should be written. This served as the exit ticket.

Lesson 2. The objective as stated in the LEARN model Lesson 2 plan (Appendix O) was that students would be able to generate ideas for three reasons and examples, using self-questioning procedural facilitation cues. A PowerPoint presentation was used to guide students through the lesson. The lesson began with *Link*. This five-minute introduction to the lesson reviewed the keywords, the IDEAS strategy, and the relationship between *Identify your opinion*, *Determine three reasons*, and *Elaborate with examples* (IDE) from Lesson 1. Then, the researcher gave an overview of the lesson using the agenda. A warm-up worksheet was given to students to label IDEAS to facilitate recall of the parts of a persuasive essay.

There were two focus components to Lesson 2 with *Engage and education*, *Active learning*, and *Reflect* of the LEARN model. The first focus of the lesson presented the

procedural facilitation cues for generating ideas for reasons. The researcher modeled how to generate reasons by presenting cues to students to ask themselves: *How does it change your mind, feelings, money, body, relationships, environment, and/or time?* These cues were accompanied by motions that the students had to follow at least once through. The motions used with each cue were: (a) mind; index fingers pointed at both sides of the head, (b) feelings; both hands on top of each other crossed over the heart, (c) money; both hands in money motion with the thumbs rubbing through the rest of the fingers, (d) body; a sweeping motion with palms facing toward the body from the top of the head to the waist, (e) relationship; one index finger pointed out and the other pointed toward the body and switching repeatedly, (f) environment; open hands with palms facing out making a large circular motion, and (g) time; one index finger pointing to the top of the wrist of the other hand. It was explained to the students that while going through the cues they must answer at least three, but they were encouraged to do more. Then, students practiced verbally with assistance from the researcher, if needed.

The second focus of the lesson had students use the procedural facilitation cues for ideation in the MBGO. The MBGO was shown with the brainstorming section and the IDEAS strategy highlighted. The researcher modeled the use of the IDEAS strategy and the cues in the MBGO with a sample writing prompt. The students then practiced on their own and shared with the researcher.

The *Now and then* component of the lesson plan consisted of identifying the seven cues. Then, the students were required to place the cues of the IDEAS strategy in order using a word/phrase bank. This served as the exit ticket.

Lesson 3. The objective as stated in the LEARN model Lesson 3 plan (Appendix P) was that students would be able to observe and follow the process of using all sections of the MBGO. A PowerPoint presentation was used to guide students through the lesson, which began with *Link*. This ten-minute introduction to the lesson reviewed the purpose of the session and gave an overview of the lesson using the agenda. The students were given an iPad with the MBGO to complete a scavenger hunt as a warm-up.

There was one focus component to Lesson 3 with *Engage and education, Active learning, and Reflect* of the LEARN model. The focus component of the lesson modeled the process of completing the full graphic organizer by soliciting students' ideas and thoughts. Each step of the modeling was practice on student's own iPad. After the students chose one of two given prompts, the researcher followed this procedure: (1) talk aloud through the process of completing the Brainstorm box based on the goal, (2) talk aloud through the process of organizing the ideas from the Brainstorm box into the Main Points column, (3) guide students through developing a sentence based on the word or phrase in the brainstorm column, (4) emphasize complete sentences with periods and capital letters, (5) highlight the light bulb to show recorded reminders and the pop-up "secret" hints, (6) make sure that all the boxes are checked before moving on,, (7) show how text will be pasted automatically when pressing Copy button, and (8) talk aloud through the 'evaluate' section of the graphic organizer. The students followed along with the researcher for all of the steps on their iPads, and then shared their essays with the researcher.

The *Now and then* component of the lesson plan consisted of identifying the parts of the MBGO example that were not completed. The students were required to explain why the MBGO needed to be fully completed. This served as the exit ticket.

Lesson 4. The objective as stated in the LEARN model Lesson 4 plan (Appendix Q) was that students would be able to use the MBGO independently. Like the other lessons, a PowerPoint presentation was used to guide students through the lesson, and it began with *Link*. This ten-minute introduction to the lesson reviewed the parts of the MBGO and gave an overview of the lesson using the agenda. The students were required to complete a worksheet using questions from the IDEAS strategy and procedural facilitation cues as a warm-up.

There was one focus component to Lesson 4 with *Engage and education, Active learning, and Reflect* of the LEARN model. This focus allowed students to complete the MBGO independently. Two prompts were provided to them on the researcher's iPad, and the students chose one to answer. The students completed all of the steps on the iPad, and then share their essays with the researcher for feedback. Students were given supports if needed.

The *Now and then* component of the lesson plan consisted of the mastery checklist to determine student competency of independent MBGO use. This determined if any students required further practice with the MBGO before transitioning to the treatment phase, which was completed one-on-one with the researcher. This also served as the exit ticket.

Treatment phase. During the treatment phase, students were given a choice of two persuasive writing prompts presented on the researcher's iPad. The students would then express their opinions in writing using the MBGO. To begin, a protocol (Appendix R) was read out loud by the researcher, and the students were given 30 minutes to complete their essays. The students received no specific support with ideation, grammar, punctuation, or spelling. However, the researcher did support students if there were technical issues. There were five treatment sessions for Keith, six for Nate and Dan, and seven for Chris.

Maintenance instructional lesson. After the treatment phase, the students were given an extra instructional lesson before proceeding to the maintenance phase. The objective as stated in the LEARN model Lesson 5 plan (Appendix S) was that students would be able to plan and use the strategies to independently write a persuasive essay without the supports of the MBGO. This lesson began with *Link*. This five-minute introduction gave an overview of the lesson using the agenda. The students were required to complete a worksheet using questions from the IDEAS strategy and procedural facilitation cues as a warm-up. Due to difficulty with spelling, the students were given the option of writing only the first letter of each word while saying the word out loud.

There was one focus component to Lesson 5 with *Engage and education, Active learning, and Reflect* of the LEARN model. The focus of the lesson guided students to independently write an essay without the MBGO. After the students chose one of two prompts, the researcher demonstrated how to use the learned strategies from the first four lessons to write the essay. First, the researcher wrote the first letters of the cues (i.e.,

MFMBERT), horizontally across the top of the document. Then, she wrote the IDEAS phrases vertically down the right side of the document. She then modeled the “think-out-loud” process of completing each part of the mnemonic while using the self-questioning procedural facilitation cues to brainstorming ideas for reasons to support the opinion. After finishing IDEAS, the researcher checked her work for completion, editing and evaluating the paragraph until it met her satisfaction. When the modeling was completed, the researcher challenged the students to try writing their paragraphs independently as demonstrated.

Maintenance phase. In the maintenance phase, students were given a choice of two writing prompts presented on the documents in their respective folders in the researcher’s Google Drive. They were able to access these on the iPad through the Google Drive app. The researcher read aloud a protocol (Appendix T), and the students were given 30 minutes to complete a response. As followed during baseline and treatment phases, students were given no writing assistance in ideation, grammar, punctuation, or spelling. There were three maintenance sessions for all four participants.

Post-intervention interview. At the completion of the research study, a semi-structured interview was conducted with each of the participants. The interview protocol (Appendix K) involved 22 questions that explored student perceptions of the different components of the intervention including the graphic organizer, lessons, IDEA strategy, and the use of cues. Students’ answers were transcribed and analyzed for the social validity of the intervention. The interviews lasted between 10 to 15 minutes.

Table 6

Research Study Timeline

Date	Chris (Tier 1)	Dan (Tier 2)	Nate (Tier 2)	Keith (Tier 3)
April 18 Day 1	WCJ/ Typing Test	WCJ/ Typing Test	WCJ/ Typing Test	WCJ/ Typing Test
April 19 Day 2	Pre- Intervention Interview	Pre- Intervention Interview	Pre- Intervention Interview	Pre- Intervention Interview
April 20 Day 3	B1	B1	B1	B1
April 21 Day 4	B2	B2	B2	B2
April 24 Day 5	B3	B3	B3	B3
April 25 Day 6	Absent	B4	B4	B4
April 26 Day 7	B4/B5	B5	B5	B5
April 27 Day 8	L1	B6	B6	B6
April 28 Day 9	L2	L1	Absent	B7
May 1 Day 10	L3	L2	L1/L2	L1
May 2 Day 11	L3/L4	L3	L3	L2
May 3 Day 12	T1	Field Trip	Field Trip	L3
May 4	T2	L1/T1	L1/T1	L3/L4

Day 13				
May 5				
Day 14	T3	T2	Absent	T1
May 8				
Day 15	T4	T3	T2/T3	T2
May 9				
Day 16	T5	T4	Absent	T3
May 10				
Day 17	T6	T5	T4/T5	Field Trip
May 11				
Day 18	T7	T6	T6	T4/T5
May 12				
Day 19	L5	Field Trip	Field Trip	L5
May 15				
Day 20	M1	L5	L5	M1
May 16				
Day 21	M2	M1	M1	M2
May 17				
Day 22	M3	M2	M2	M3
May 18	Post- Intervention			Post- Intervention
Day 23	Interview	M3	M3	Interview
May 19		Post- Intervention	Post- Intervention	
Day 24		Interview	Interview	

Note. B = baseline session, L= lesson session, T = treatment session, M = maintenance session.

Data Analysis

To evaluate the data collected from each of the measures during baseline, treatment, and maintenance phases, the researcher used visual analysis; a method often used to analyze data in single-subject research. She also calculated figures for percent non-overlapping data (PND) and percent exceeding the median (PEM). Additionally, the researcher used descriptive statistics to calculate the number of procedure cue choices made by the participants during the treatment phase and qualitative analysis to review the notes taken on how they were used.

Visual analysis. The researcher's rationale for using visual analysis in single-subject research was threefold. First, it provides a conservative assessment of the effectiveness of the intervention for data for it must show a well-defined change in behavior. Second, it allows the readers to assess the data directly. Finally, using the data, the researcher was able to assess if changes were needed while conducting the study. This approach allowed the researcher to determine whether the baseline data was stable enough to move on to the treatment phase (Campbell & Herzinger, 2010). As recommend by Gast and Spriggs (2015), the researcher used separate graphs to present each of the six dependent measures: number of words, number of sentences, number of transition words, holistic quality, functional essay elements, and coherence. The graphs were further delineated for the different participants across the different phases (i.e., baselines, treatment, and maintenance). Using the graphs, the researcher examined the following: level, trend, overlap, variability, consistency, and immediacy of effect. Visual analysis of level, trend, and variability was conducted the meet the quality standards set

by Horner et al. (2005) for a single-subject research. Two types of level changes, absolute and relative, determined the average achievement of each phase. Absolute level change was calculated by subtracting the first data point within a phase by the last data point. If the value was positive, then the level was going in the desired direction. Similarly, the relative level was found by first determining the median within the phase. Then, the mean of the first half was subtracted by the mean of the second half. If the value was positive, then the level was in the desired direction.

Trend refers to both the direction and the rate of change in the dependent variable as indicated by the best line of fit. The trend was determined through the split-middle acceleration line procedure (White & Haring, 1980) of the data points within a phase. To draw the trend line, the researcher divided the graph into two (i.e., the halfway point on the x-axis). Then, she calculated the median of the data points (i.e., the y-axis) of the first half and second half of the graph and drew a line through them.

Variability is the range of the change that occurs around the mean. Variability was determined through the application of the 80-25 rule on the level and trend lines. According to the 80-25 rule, a phase has a low variability, which is desirable, if 80% of data points fall within 25% of the level or trend lines (Gast & Sprigs, 2014).

Also, the researcher used visual analysis to assess the immediacy of effect between the last data point of one phase and the first data point of the next phase, the number of data points that overlap between levels of adjacent phases, and consistency of patterns of data points across similar phases.

PND. Percentage of non-overlapping data (PND) is a non-parametric statistic that was used to determine the effectiveness of the intervention by comparing the data points of the baseline phase to the intervention phase. The PND was calculated by dividing the number of data points in the treatment that was greater than the highest data point in the baseline by total number of treatment data points (Scruggs, Mastropieri, & Casto, 1987). The PND ranges from 0-100% and its interpretation is as follows: < 50% was considered not reliable nor effective, 50%-70% questionable, 70%-90% fairly or moderately effective, and > 90% highly effective (Scruggs & Mastropieri, 1998).

PEM. Similar to the PND, percentage of data points exceeding the median (PEM) was used to determine the effectiveness of the intervention and to support the visual analysis (Ma, 2006). PEM was calculated by dividing the number of treatment data points that were greater than the median of the baseline by the total number of treatments. This took into account the outliers in the baseline that might have been due to factors other than student ability. In addition, it gives a more accurate understanding of the data with ceiling or floor data points. Similar to the PND, it is a non-parametric statistic, and its scores range from 0 to 1 with: < .7 as questionable or not effective, .7- to .9 as moderately effective, and .9 to 1 as being highly effective.

Descriptive analysis. Descriptive analysis was done on the data collected on the procedural cues each participant chose throughout the treatment phase. The app recorded the cue selection, and the researcher separately recorded the cue selection. This information along with the participant's name, the treatment session, and notes of observation on the use were documented through google forms. When there was a

discrepancy between the researcher and the app, it was deferred to the app's record of the participant's cue selection. In one incidence, there was an error in the app, in which case, the researcher's observation was used. The researcher then calculated the total number and percentage of cues used across participants and the order in which the cues were chosen.

Social validity analysis. The pre- and post-intervention interviews were examined to determine the practicality of the intervention by assessing the social importance of the dependent variables, the appropriateness of the procedures of the intervention, and the utility of the intervention (i.e., the independent variable) in a non-research setting (Horner et al., 2005). According to Gast (2014), participant insights are an essential component of single-subject design. All of the interviews were transcribed in Microsoft Word for analysis. The review of data used a multi-step strategy presented by Maxwell and Miller (2008). First, an initial analysis was done by simply reading through the interview transcripts. Then, the transcripts were read with notes taken on themes. These notes were drafted into categories that were tentative in nature and later shaped and refined. Finally, relationships were explored between different categories to link ideas and themes into final units. The findings of these units are presented as results in Chapter 3.

Reliability and Fidelity

This section presents the researcher's procedure for examining the reliability and fidelity of the study. This includes the interobserver agreement of all the measures in

scoring the essays and the fidelity of the baseline, lessons, treatment, and maintenance sessions.

IOA for scoring. To ensure the accuracy of scoring, interobserver agreement (IOA) data were collected for all dependent variables. Prior to scoring, the researcher conducted a three-hour observer training session for scoring the six measures using sample essays written by students of similar demographics. The observer was a doctoral student with a master's degree in education who was familiar with the intervention because she was part of the original Project WeGotIt research team (Regan et al., 2017). The researcher and the observer were both previously trained, on two separate occasions and by the same person, on scoring the number of words, sentences, transition words, and use of the holistic quality rubric. Therefore, the majority of time during the training session was used on scoring functional essay elements and coherence. During the training, the researcher conducted an in-depth review of the guideline sheets for scoring essay elements and coherence (Appendix G and Appendix I) using a scored essay example. She also modeled scoring with an emphasis on annotating the different elements of the writing. A scoring sheet was used to standardize the record keeping in scoring. The scoring sheet (Appendix U) included a place to write the student's name, session and the scores for the six measures. Also, next to the coherence score, was a string of boxes where the scorers wrote the essay elements, in order, to simplify the process of determining the longest string. The researcher and the observer practiced scoring with sample essays until 100% agreement was met.

The researcher scored 100% of the essays, and the observer scored at least 33% (ranging between 33.3% - 43%) of each phase and measure per participant. The observer scored two baselines, three treatments, and one maintenance essay from Chris; three baselines, three treatments, and one maintenance essay from both Nate and Dan; and three baselines, two treatments, and one maintenance essay from Keith; for a total of 26 essays. There was at least 80% agreement in the number of words (100%), number of sentences (96.2%), number of transition words (100%), functional essay elements (80.8%), coherence (80.8%) and holistic writing quality (80.8%). The IOA was calculated by dividing the total number of agreements by the total number scored then multiplied by 100. With six measures, there were 156 data scores, of which there were 16 (10.3%) data points of discrepancy with an average of 89.7% agreement across all measures.

Fidelity of treatment. A fidelity checklist was completed for each session of the study. This included five to seven baseline sessions, five instructional lessons (including the maintenance lesson), five to seven treatment sessions, and three maintenance sessions for a total of 20 sessions per participant. (Only one was completed in the sessions where Nate and Dan were together.) The researcher completed a fidelity checklist during each session to ascertain that the testing sessions and instructional lessons included all pre-determined procedures. This was to ensure that the sessions were less likely to be affected by unknown variables in determining the functional relation between the intervention (i.e., independent variable) and the results. It is important to note that while the original checklist for baseline was completed, the video recording was lost and

therefore the IOA for the baseline could not be established. The checklists were compared for percent of agreement between the researcher and the observer for the fidelity.

A one-hour training session, led by the researcher, was provided to this second observer. The observer was a public school curriculum specialist with a master's degree in education and over ten years of teaching experience. In the training, the researcher reviewed the lesson plans and the treatment and maintenance protocol. Then, the fidelity checklists were introduced with instruction on their purpose and practical application. Previous video recordings of a lesson, treatment session, and maintenance session were watched, and the researcher and observer checked concurrently. There was 100% agreement between researcher and observer separate training videos were scored independently. This may be attributed to the clearly observable nature of the items on the checklists (Appendix E).

The researcher completed 100% of the fidelity checklists during the study, and the observer scored at least 45% (ranging between 46.1% - 50%) of each phase per participant, except baselines as mentioned above. The treatment was delivered with a high degree of fidelity at 99%. The observer scored two lessons, three treatments, and one maintenance session from Chris; two lessons, three treatments, and one maintenance session from both Nate and Dan; and two lessons, two treatments, and one maintenance session from Keith; for a total of 17 sessions. The agreement of the fidelity of treatment between the researcher and the observer was 98%. The IOA was calculated by dividing

the total number of steps completed in the checklists by the total number of steps in the checklist, then multiplied by 100.

Summary

This chapter outlined the research methods that were used to determine a functional relation between using an MBGO and the persuasive essay writing performance of middle school students with emotional and behavioral disorders. The characteristics of the school and the students were described. The independent variable, dependent variables, and procedures of the proposed study were also discussed. Finally, the data analysis, reliability procedures, and fidelity procedures concluded this chapter.

Chapter Four

This chapter presents the results of the study on the use of the mobile-based graphic organizer with embedded procedural facilitation cues to support idea generation in persuasive writing for middle school students with emotional and behavioral disorders (EBD). This study used a multiple-baseline single subject design intervention that was delivered through four instructional/treatment lessons and one maintenance lesson. The student data was collected during baseline, treatment and maintenance sessions. Six measures of student performance were collected: number of words, number of sentences, number of transition words, holistic quality, functional essay elements, and coherence. In addition to these six measures, data from procedural facilitation observation sheets and interviews were gathered to determine the participants' use of the cues and social validity, the research questions that were investigated were as follows:

1. Is there a functional relation between using a mobile-based graphic organizer with embedded procedural facilitators and improvements in the number of words, sentences and transition words of persuasive writing for middle school students with emotional and behavioral disorders?
2. Is there a functional relation between using a mobile-based graphic organizer with embedded procedural facilitators and improvements in the essay elements and coherence of persuasive writing for middle school students with emotional and behavioral disorders?

3. Is there a functional relation between using a mobile-based graphic organizer with embedded procedural facilitators and improvements in the holistic quality of persuasive writing for middle school students with emotional and behavioral disorders?
4. Do middle school students with emotional and behavioral disorders maintain the number of words, sentences, transition words, holistic quality, functional elements and coherence in persuasive writing when a mobile-based graphic organizer is no longer available to them?
5. How do middle school students with emotional and behavioral disorders use the embedded procedural facilitation features in the brainstorming component when independently completing the mobile-based graphic organizer to write a persuasive essay?

The following sections will describe the findings of each measure. First, a summary of the overall group results will be presented for the number of words, number of sentences, number of transition words, functional essay elements, coherence, holistic writing quality. Then, the use of procedural facilitation including the cues chosen and the order of the selected cues will be described as a group and individually. Finally, the social validity of the study will be discussed.

Number of Words

In counting the number of words, a word was defined as a letter or a combination of letters with one space before and one after. A word must include a vowel unless the

letter y is used instead as in the word *gym*. In scoring, words were not discriminated for spelling accuracy.

Across participants, the mean number of words written increased across all participants between the baseline phase and the treatment phase, and between the baseline phase and the maintenance phase (see Figure 2). In the baseline phase, the mean number of words was 27.58 per essay ($SD = 13.29$) ranging from 6 to 53 words. In the treatment phase, the mean number of words was 78 per essay ($SD = 32.53$) ranging from 35 to 147 words. There was a 182.8% increase in the mean number of words from the baseline phase to the treatment. In the maintenance phase, the mean number of words was 80.8 per essay ($SD = 42.59$) ranging from 28 to 160 words. There was 190.36% increase in the mean number of words from the baseline phase to the treatment. To determine the effects of the data, visual analysis of the graphs of student results were used to assess within- and between- phase data for level, trend, variability, the immediacy of effect, overlap, and consistency of data patterns. Based on the visual analysis of data (Figure 2), there is strong evidence of a functional relation between the intervention and the number of words produced.

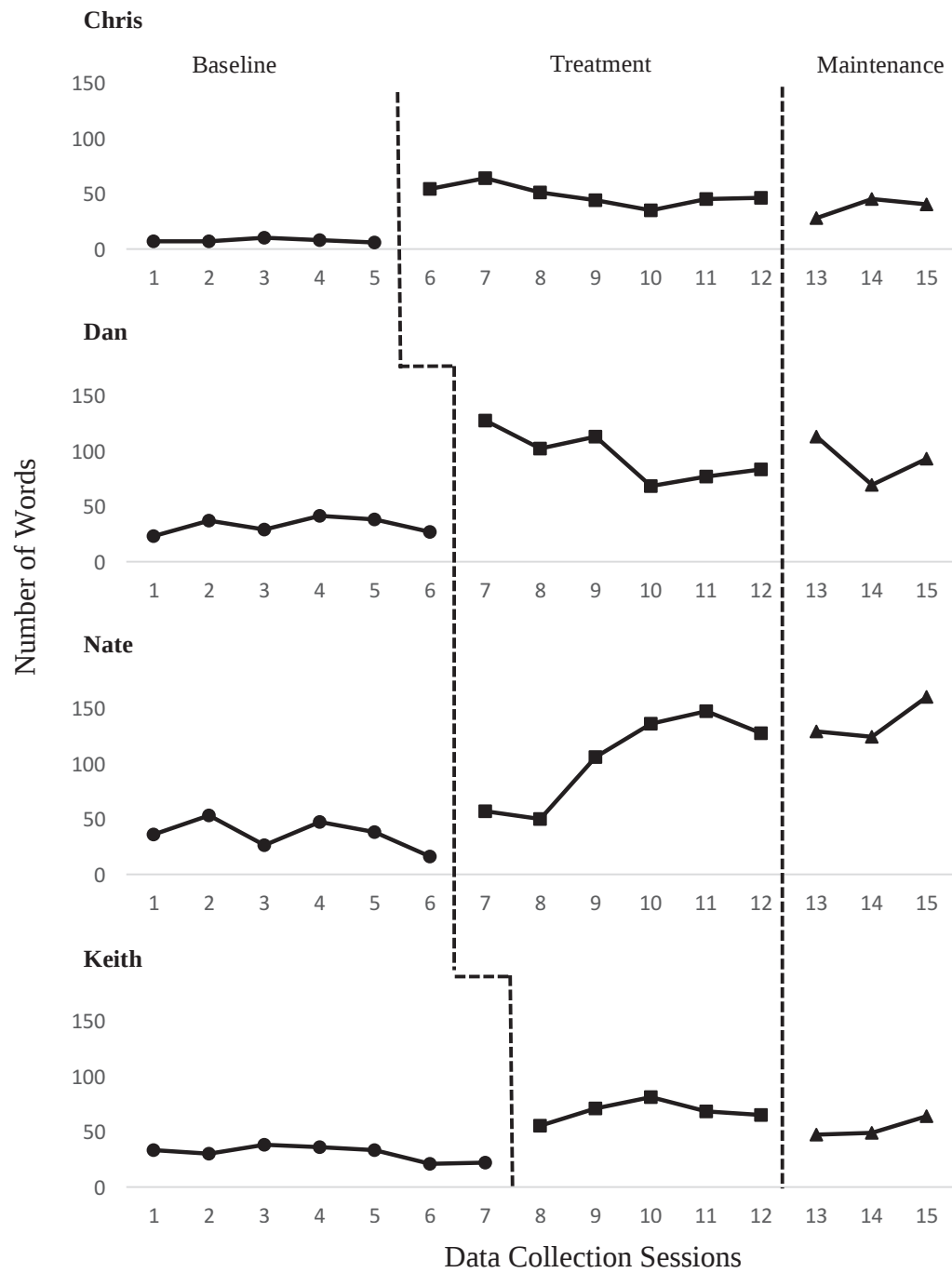


Figure 2. Number of words written. This figure presents the number of words written per essay by participants in baseline, treatment, and maintenance.

Chris. Baseline data for Chris was low and stable ranging between 6 to 10 words across five baseline sessions with an overall mean number of words at 7.6 ($SD = 1.52$). During the treatment phase, data presented an immediacy of change following the introduction of the intervention with an increased level change. Data in the treatment phase demonstrated a slight downward trend with low variability ranging between 35 to 64 words and an overall mean of 48.43 words ($SD = 9.11$). The PND was 100% with no overlap of data points between the baseline and the treatment phase indicating high effectiveness of the intervention. The PEM was also 100% with all data exceeding the median of the baseline, indicative of high effectiveness. Throughout the maintenance phase, the mean was lower than in treatment but higher than during baseline. Chris's data displayed a slight upward trend, and the data ranged between 28 to 45 words with an overall average of 37.67 words ($SD = 8.74$).

Dan. Dan's baseline data demonstrated a slight upward trend line with a range of 23 to 41 words across six baseline sessions with an overall mean of 32.5 words ($SD = 7.15$). The change in level between baseline and treatment also indicated an immediacy of effect. During the treatment phase, data demonstrated a slight downward trend line with moderate variability ranging between 68 to 127 words and an average of 95 words ($SD = 22.78$). The absolute level change from the first half ($M = 114$) and the second half ($M = 76$) was -33.33% in the undesired direction. However, PND was 100% with no overlap of data points between the baseline and the treatment phase which indicated high effectiveness of the intervention. The PEM was also 100% with all data exceeding the median of the baseline and an indication of high effectiveness. The mean number of

words in the maintenance phase fell slightly from the treatment but remained higher than the baseline phase. Data displayed a downward trend line during maintenance, and the data ranged between 69 to 113 with a mean number of 91.67 words ($SD = 22.03$).

Nate. Nate's baseline phase demonstrated a slight downward trend line with a range of 16 to 53 words across six baseline sessions with an average of 36 words ($SD = 13.52$). During the treatment phase, the higher level and positive slope of the trend line established an immediacy of effect. The data presented a high upward trend line with variability ranging between 50 to 147 words and a mean of 103.83 words ($SD = 41.31$). The PND was 83.33% with one data point overlapping between baseline and treatment indicating moderate effectiveness of the intervention. The PEM was 100% with all data exceeding the median of the baseline indicating high effectiveness. In the maintenance phase, data was higher than in the baseline and the treatment phase. There was an upward trend line extending from the treatment phase, and the data ranged between 124 to 160 with an overall mean of 137.67 words ($SD = 19.5$).

Keith. Baseline data for Keith was stable ranging from 21 to 38 words across seven baseline sessions with an average of 30.43 words ($SD = 6.6$). During the treatment phase, data presented an immediate increase in level from the baseline. The treatment phase demonstrated a slight upward trend line with low variability ranging between 55 to 81 words and an average of 68 words ($SD = 9.43$). PND was 100% with no overlap of data points between the baseline and the treatment phase indicating high effectiveness of the intervention. The PEM was also 100% with all data exceeding the median of the baseline indicating high effectiveness. During the maintenance phase, the mean number

of words was lower than during treatment but higher than in the baseline phase. Data displayed a slight upward trend line. Data ranged between 47 to 64 words with a mean of 53.33 words ($SD = 9.29$).

Number of Sentences

When counting the number of sentences per essay, a sentence was defined as a construction of a basic sentence with a subject, a verb, and ends with correct punctuation. In scoring, words were not discriminated for grammatical, syntactical and/or spelling accuracy. Sentences were manually counted by the researcher and the observer.

The mean number of sentences across all participants increased between the baseline phase and the treatment phase (see Figure 3). In the baseline phase, the mean number of sentences was 1.67 per essay ($SD = .87$) ranging from 0 to 3 words. In the treatment phase, all participant data showed an immediacy of effect with an increase in level from baseline and a mean of 6.08 sentences per essay ($SD = .93$) ranging from 5 to 8 sentences. There was a 264.07% increase in the mean number of sentences from baseline to treatment. In the maintenance phase, the mean number of sentences was 5.5 sentences per essay ($SD = 1.38$) ranging from 4 to 9 sentences. To determine the effects, visual analysis of the graphs of student results were used to assess within- and between-phase data for level, trend, variability, the immediacy of effect, overlap, and consistency of data patterns. Based on the visual analysis of data (Figure 3), there is a strong evidence of a functional relation between the intervention and the number of sentences produced.

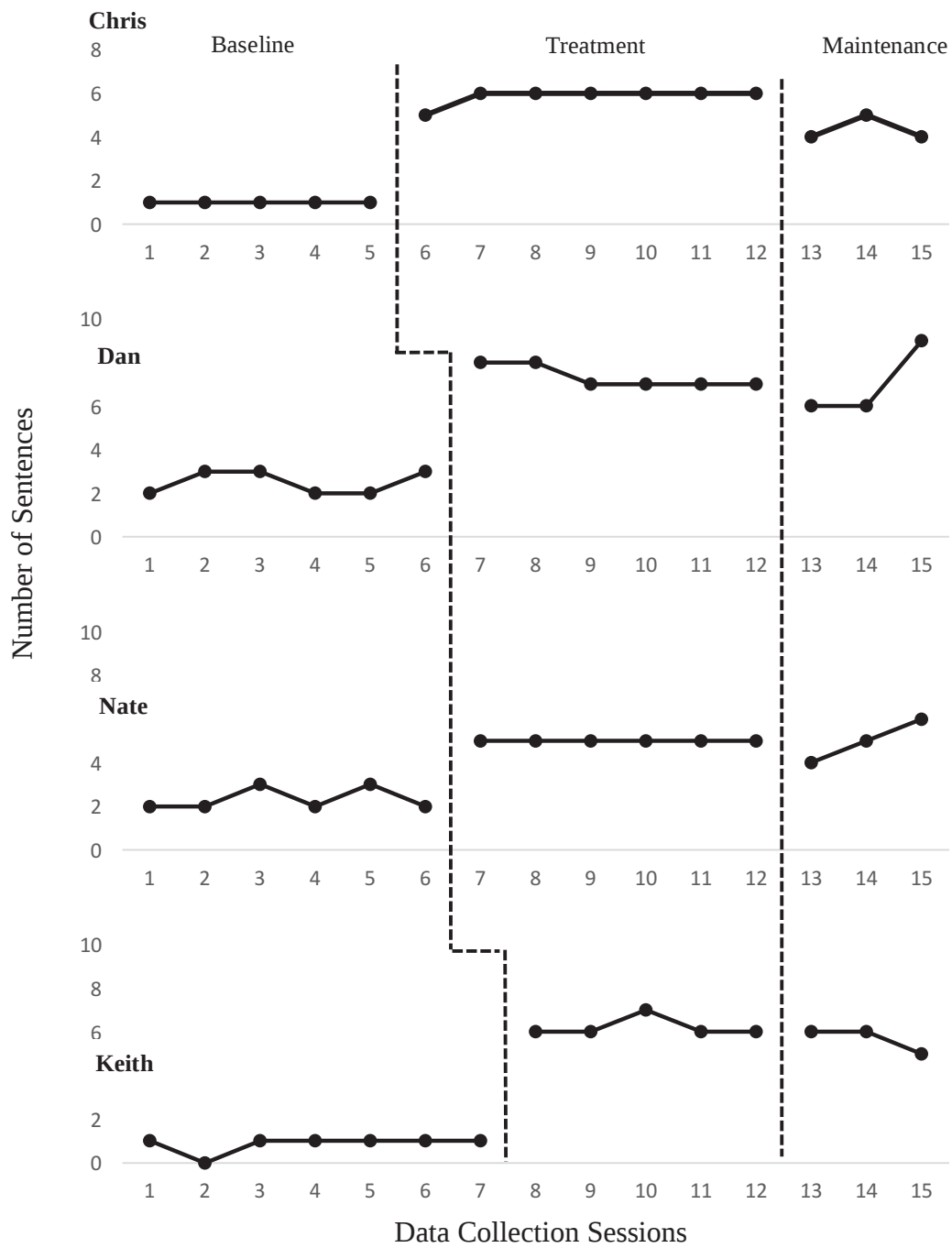


Figure 3. Number of sentences. This figure presents the number of sentences written per essay by participants in baseline, treatment, and maintenance.

Chris. Chris's baseline data was low and stable with no variability, writing one sentence across five baseline sessions. All of the baseline sentences followed the same pattern, a simple sentence structure stating his opinion. During the treatment phase, there was a level change, and an immediacy of effect can be seen. A flat trend line was demonstrated with almost no variability ranging between 5 to 6 sentences and an overall mean of 5.86 sentences ($SD = .38$). The PND was 100% with no overlap of data points between baseline and treatment indicating high effectiveness of the intervention. The PEM was also 100% with all data exceeding the median of the baseline and indicating high effectiveness. In the maintenance phase, the mean number of sentences was lower than the treatment but higher than in the baseline phase. Data displayed a slight upward trend and then a downward trend line. Data ranged between 4 to 5 with an average of 4.33 sentences ($SD = .58$).

Dan. The baseline data for Dan was stable ranging between 2 to 3 sentences across six baseline sessions and a mean of 2.5 sentences ($SD = .55$) with a slight upward trend. During the treatment phase, data presented an immediate effect change with an increased level from the baseline phase. The data points indicated a flat trend with low variability ranging between 7 to 8 sentences and a mean of 7.33 words ($SD = .52$). The PND was 100% with no overlap of data points between the baseline and the treatment phase indicating high effectiveness of the intervention. The PEM was also 100% with all data exceeding the median of the baseline indicating high effectiveness. In the maintenance phase, the level was slightly lower than in treatment but distinctly higher

than in the baseline phase. The final data point showed an upward trend, and the number of sentences ranged between 6 to 9 with a mean of 7 sentences ($SD = 1.73$) per essay.

Nate. Baseline data for Nate ranged between 2 to 3 sentences across six baseline sessions and an average of 2.33 sentences ($SD = .52$) per essay. There was a flat trend in the baseline with moderate variability. During the treatment phase, there was an immediate increase upon introducing the intervention and a level change. The treatment data demonstrated a flat trend line with no variability at five sentences. The PND was 100% with no overlap of data points between the baseline and the treatment phase indicating high effectiveness of the intervention. The PEM was also 100% with all data exceeding the median of the baseline indicating high effectiveness. In the maintenance phase, data was similar to treatment and distinctly higher than baseline. The data points indicated a positive trend line. The number of sentences ranged from 4 to 6 with an average of 5 sentences ($SD = 1$).

Keith. Data in Keith's baseline phase ranged from 0 to 1 sentence across seven baseline sessions with an average of .86 sentences ($SD = .38$) per essay with a general flat trend line. During treatment, an immediacy of effect was established, and an increased level change. The treatment phase data demonstrated an overall flat trend line with one data point increase in the middle of the phase. Data ranged from 6 to 7 sentences with an average of 6.2 sentences ($SD = .45$). The PND was 100% with no overlap of data points between baseline and treatment, indicating high effectiveness of the intervention. PEM was also 100% with all data points exceeding the median of the baseline, indicating high effectiveness. In the maintenance phase, data was similar to

treatment and distinctly higher than in the baseline phase. However, data displayed a slight downward trend line, with the number of sentences ranging between 5 and 6 with a mean of 5.67 sentences ($SD = .58$).

Number of Transition Words

The number of transition words was defined as a word or a phrase at the beginning of a sentence that represents a transition of thoughts or connects ideas from a previous sentence. Scoring of the transition words was one per transition, that is, if the transition is a phrase (more than one word), it was still counted as one transition word. These words and phrases included but were not limited to, *for example*, *to illustrate*, *therefore*, *also first*, and all the transition words provided in the drop-down menu of the MBGO. They were manually counted by both the researcher and the observer.

As a group, the mean number of transition words written increased across all participants between baseline and treatment and the increase was immediate upon the onset of the intervention (see Figure 4). During baseline, few if any, transition words were included with a mean of .21 transition words per essay ($SD = .41$) ranging from 0 to 1 transition word. During treatment, the mean number of transition words was 5.3 per essay ($SD = .55$) ranging from 5 to 7 transition words. In the maintenance phase, participants' use of transition words was slightly lower than in the treatment phase but higher than in the baseline. The mean number of transition words was 4.58 per essay ($SD = 1.38$) ranging from 3 to 8 transition words. To determine the effects, visual analysis of the graphs was used to assess within- and between- phase data for level, trend, variability, the immediacy of effect, overlap, and consistency of data patterns. Based on the visual

analysis of data (Figure 4), there is a strong evidence of a functional relation between the intervention and the number of transition words produced.

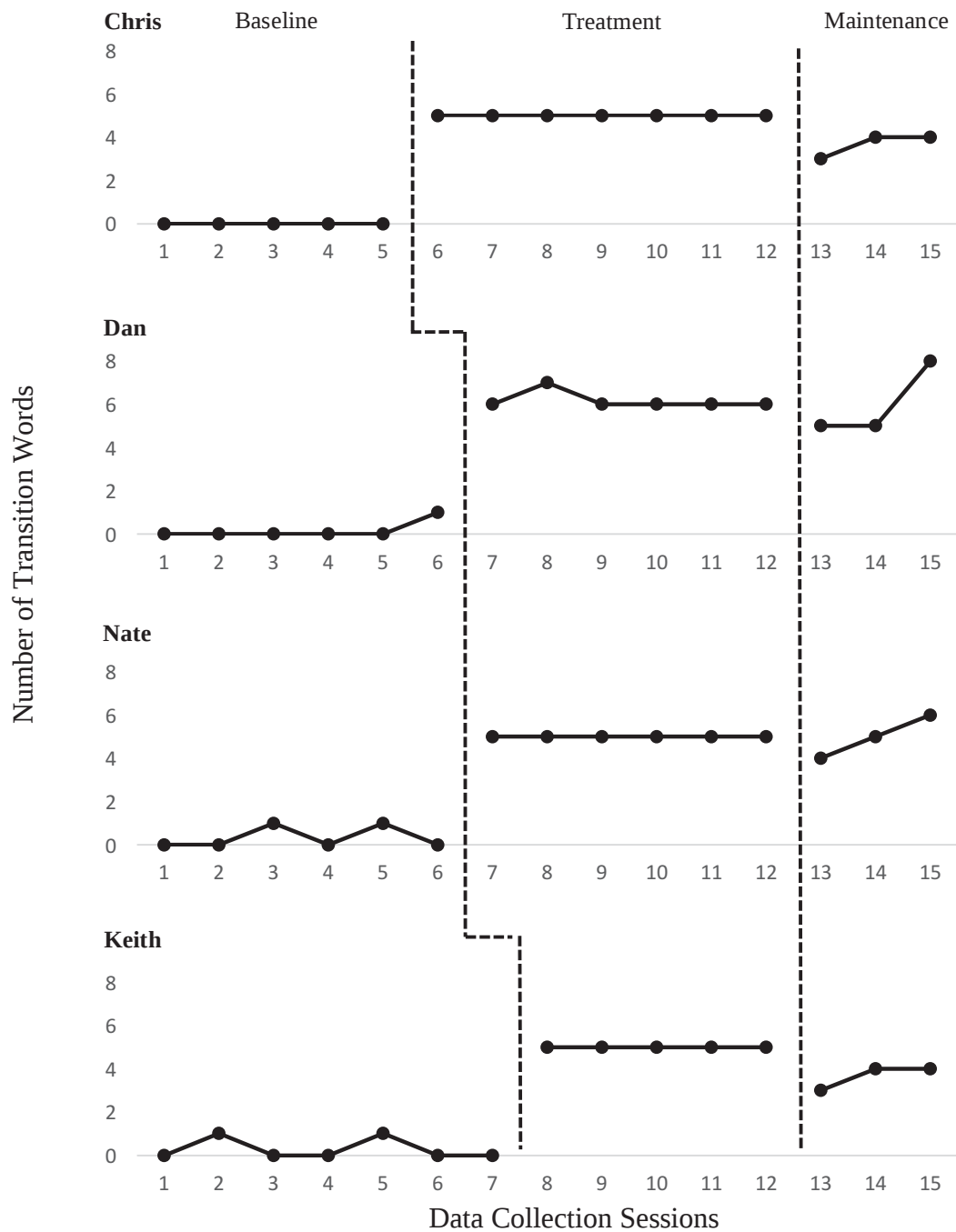


Figure 4. Number of transition words used. This figure presents the number of transition words written per essay by participants in baseline, treatment, and maintenance

Chris. Baseline data for number of transition words for Chris was at zero with no variability across five baseline sessions. His baseline essays contained just one sentence each, and therefore a connecting transition word between sentences was absent. During the treatment phase, data presented a level change and an immediacy of effect. Data during treatment demonstrated a flat trend line with no variability across seven sessions at five transition words per essay. The PND was 100% with no overlap of data points between the baseline and the treatment phase indicating high effectiveness of the intervention. The PEM was also 100% with all data points exceeded the median of the baseline indicating high effectiveness. In the maintenance phase, the mean number of transition words was lower than in treatment but higher than in the baseline phase. Data displayed an upward trend line. Data ranged between 3 to 4 with a mean of 3.67 transition words ($SD = .58$) per essay.

Dan. Dan's baseline data was low and stable with no transition words except for the last baseline data point of one transition word. Across six baseline sessions, the baseline data had an average of .17 transition words ($SD = .41$) with an upward trend. During the treatment phase, data presented a level change and an immediacy of effect. The trend line was flat with low variability during treatment ranging between 6 to 7 transition words and a mean of 6.17 transition words ($SD = .41$). The PND was 100% with no overlap of data points between the baseline and the treatment phase indicating high effectiveness of the intervention. The PEM was also 100% with all data points exceeding the median of the baseline indicating high effectiveness. In the maintenance phase, the mean number of transition words was slightly lower than in treatment but

distinctly higher than baseline. The maintenance phase displayed an upward trend line, which ranged between 5 to 8 transition words with a mean of 6 transition words ($SD = 1.73$) per essay.

Nate. Data in Nate's baseline was low and stable ranging from 0 to 1 transition words across six baseline sessions with an average of .33 transition words ($SD = .52$). During the treatment phase, data presented an immediate effect change indicated by an increase in level from the baseline. There was flat trend line with no variability at five transition words across all six sessions. The PND was 100% with no overlap of data points between the baseline and the treatment phase indicating high effectiveness of the intervention. The PEM was also 100% with all data points exceeding the median of the baseline indicating high effectiveness. In the maintenance phase, the level of data was similar to that of treatment and distinctly higher than in the baseline phase. Data displayed a high upward trend line, which ranged between 4 to 6 transition words with a mean of five transition words ($SD = 1.00$).

Keith. The baseline data for Keith was low and stable ranging from 0 to 1 transition words across seven baseline sessions with an average of .29 transition words ($SD = .49$) per essay. During treatment, an increased level from the baseline and an immediate change were observed. There was a flat trend line with no variability with five transition words across all five sessions. The PND was 100% with no overlap of data points between the baseline and the treatment phase indicating high effectiveness of the intervention. The PEM was also 100% with all data points exceeding the median of the baseline indicating high effectiveness. In the maintenance phase, the level of data was

lower than in the treatment phase but higher than baseline. Data displayed a slight upward trend line, which ranged between 3 to 4 transition words with an average of 3.67 transition words ($SD = .58$).

Functional Essay Elements

Functional essay elements are units of information in the essay that relate directly to supporting the writers' argument in a persuasive essay. The elements were counted by separating the essay into smaller items and determining if the elements were functional or non-functional. The mean number of functional essay elements increased across all participants between the baseline phase and the treatment phase. There was an immediacy of effect upon the onset of the intervention (see Figure 4). During baseline, data scores ranged from 1 to 4 functional essay elements with a mean of 2.63 functional essay elements per essay ($SD = 1.06$). In the treatment phase, the mean number of functional essay elements was 6.79 ($SD = 1.28$) ranging from 4 to 10 elements, a +158.17% level change. The overall mean across the participants was 7.5 functional essay elements ($SD = 3.00$) ranging from 4 to 14 elements. To determine the effects, the visual analysis of graphs of student results were used to assess within- and between-phase data for level, trend, variability, immediacy of effect, overlap, and consistency of data patterns. Based on the visual analysis of data (Figure 5), there is a strong evidence of a functional relation between the intervention and the number of functional essay elements produced.

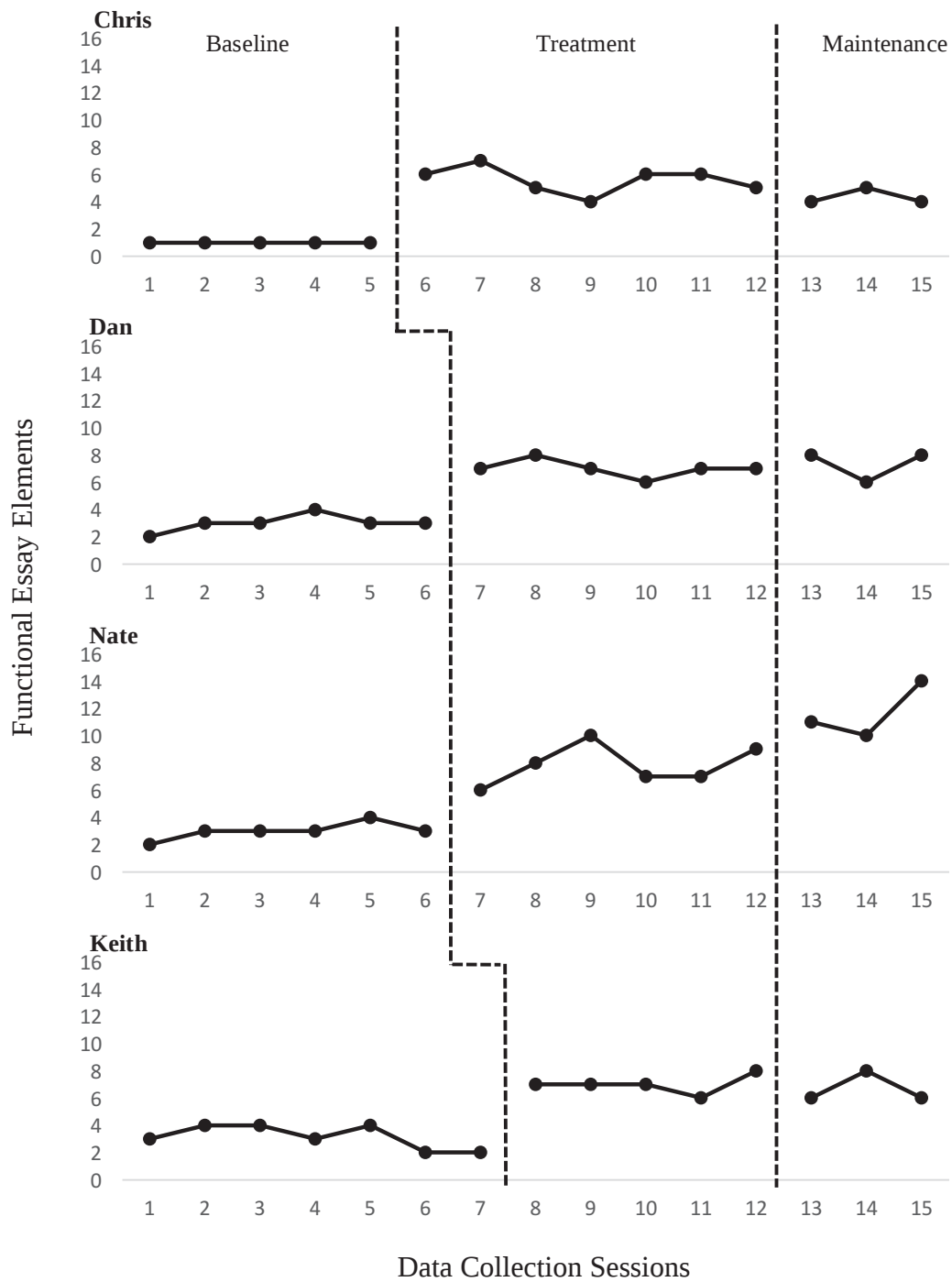


Figure 5. Functional essay elements. This figure presents the number of functional essay elements per essay by participants in baseline, treatment, and maintenance.

Chris. Baseline data for Chris was flat with no variability with only one functional essay element across all five baseline sessions. When the intervention was introduced, there was an immediate change with the number of functional essay elements ranging from 4 to 7. The mean number of functional essay elements was 5.57 ($SD = .98$). The treatment phase demonstrated a level change with a flat trend line and a moderate variability. The PND was 100% with no overlap of data points between the baseline and the treatment phase indicating high effectiveness of the intervention. The PEM was also 100% with all data points exceeding the median of the baseline indicating of high effectiveness. In the maintenance phase, the level of data was slightly lower than in treatment but higher than baseline. Data displayed a flat trend line, ranging between 4 to 5 functional essay elements with a mean of 4.33 elements ($SD = .58$).

Dan. Dan's baseline data was stable with two functional essay elements in the first baseline essay and three for the remaining six baseline essays. Dan included an average of 3 elements ($SD = .63$) per essay. During the treatment phase, data presented an immediate effect change with increased level from the baseline phase. There was a flat trend line with low variability ranging between 6 to 8 functional essay elements and a mean of 7 elements ($SD = .63$). The PND was 100% with no overlap of data points between the baseline and the treatment phase indicating high effectiveness of the intervention. The PEM was also 100% with all data points exceeding the median of the baseline indicating high effectiveness. In the maintenance phase, the mean was slightly higher than in treatment and distinctly higher than baseline. Data displayed a flat trend

line, which ranged between 6 to 8 with a mean of 7.33 functional essay elements ($SD = 1.15$).

Nate. The baseline data for Nate was stable ranging between 2 to 4 functional essay elements across six baseline sessions with a mean of 3 elements ($SD = .63$) per essay. During the treatment phase, a higher level was observed with an upward trend. Upon onset of the intervention, there was an immediacy of effect. There was moderate variability of data points during treatment ranging between 6 to 10 functional essay elements and a mean of 7.83 elements ($SD = 1.47$), an increase of 161% from the baseline. The PND was 100% with no overlap of data points between the baseline and the treatment phase, and the PEM was 100% with all data points exceeding the median of the baseline. Both PND and PEM indicated high effectiveness. The maintenance phase showed an increase in level from treatment. Data displayed an upward trend line, which ranged between 10 to 14 with a mean of 11.67 functional essay elements ($SD = 2.08$).

Keith. Keith's baseline indicated a slight downward trend line, ranging from 2 to 4 functional essay elements per essay and a mean of 3.14 elements ($SD = .90$). There was an immediacy of effect and an increase in level from baseline to treatment. The data indicated a flat trend line with low variability ranging between 6 to 8 functional essay elements with a mean of 7 elements ($SD = .71$). The PND was 100% with no overlap of data points between the baseline and the treatment phase indicating high effectiveness of the intervention, and PEM also indicated high effectiveness with 100% of all data points exceeding the median of the baseline. In the maintenance phase, the level remained similar to the treatment but was clearly higher than baseline. Data displayed a flat trend

line, which ranged between 6 to 8 with an average of 6.67 functional essay elements ($SD = 1.15$) per essay.

Coherence

Coherence was scored for the longest connected units of functional essay elements used to measure the logical sequence of related ideas in a persuasive essay. Across participants, the mean baseline coherence score was low at +1.79 coherence ($SD = 1.10$) ranging from 0 to +3. The immediacy of effect change was evident in the treatment phase, and there was a level change between baseline and treatment (see Figure 6). In the treatment phase, the mean coherence score was +5.58 ($SD = 1.50$) ranging from +2 to +8 with flat trend lines and low variability. The mean coherence score across participants in maintenance was +6.5 ($SD = 3.15$) ranging from +3 to +13. To determine the effects of the data, visual analysis of graphs of student results were used to assess within- and between- phase data for level, trend, variability, immediacy of effect, overlap, and consistency of data patterns. Based on the visual analysis of data (Figure 6), there is a strong evidence of a functional relation between the intervention and the coherence score.

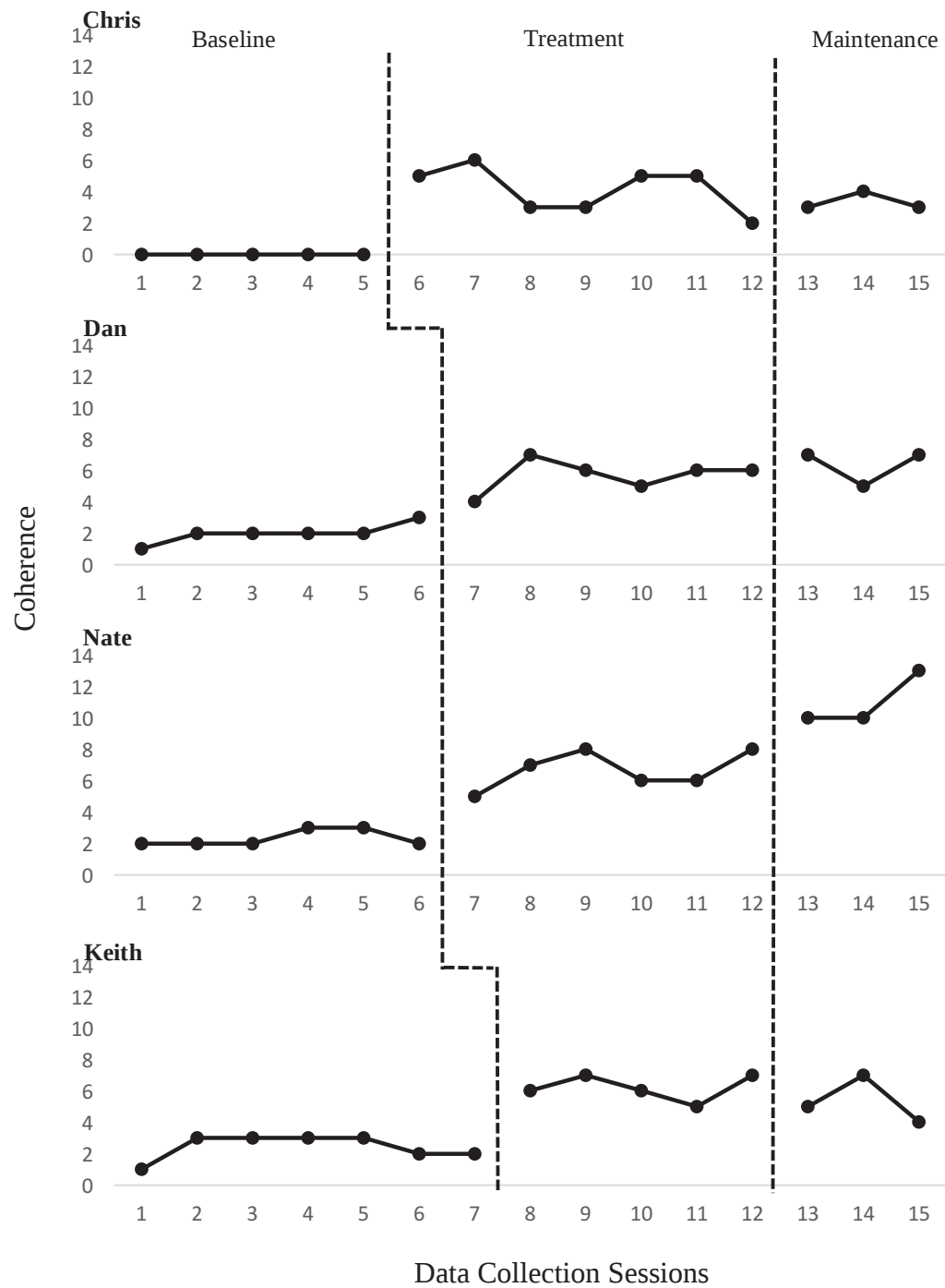


Figure 6. Coherence score. This figure presents the coherence scores of participants in baseline, treatment, and maintenance.

Chris. The baseline coherence data for Chris was zero with no variability across all five baseline sessions. During the treatment phase, data presented a rapid immediacy of change and a level change from baseline to treatment. Coherence scores ranged from +2 to +6 with a mean of +4.14 ($SD = 1.46$). The treatment trend line was flat with moderate variability. The PND was 100% with no overlap of data points between the baseline and the treatment phase indicating high effectiveness of the intervention. The PEM was also 100% with all data points exceeding the median of the baseline indicating high effectiveness. In the maintenance phase, the level of data was slightly lower than in treatment but higher than baseline. Data displayed a flat trend line with low variability, which ranged between +3 to +4 and an average of +3.33 ($SD = .58$) coherence score.

Dan. The baseline data was low and stable. The average coherence score of six baseline essays was +2 ($SD = .63$). An increased level from the baseline phase to the treatment and an immediate effect change upon the onset of the intervention was observed. Data in treatment demonstrated a flat trend line with low variability in scores ranging between +4 to +7 and an overall level of +5.67 ($SD = 1.03$). The PND was 100% with no overlap of data points between the baseline and the treatment phase indicating high effectiveness of the intervention. The PEM was also 100% with all data points exceeding the median of the baseline indicating high effectiveness. The maintenance phase's mean coherence score was slightly higher than the treatment mean score, and distinctly higher than in the baseline phase. Data displayed a flat trend line with low variability and ranged between +5 to +7 with a mean of +6.33 ($SD = 1.15$).

Nate. Nate's coherence scores in the baseline were flat with low variability and ranged between +2 to +3 across six baseline sessions with a mean of +2.33 ($SD = .52$). During the treatment phase, a level change and upward trend indicated an immediacy of effect. Data points had low variability with coherence scores ranging between +5 to +8 and a mean of +6.67 ($SD = 1.21$). The PND was 100% with no data point overlap between the baseline and the treatment phase indicating moderate effectiveness of the intervention. The PEM was 100% with all data points exceeding the median of the baseline indicating high effectiveness. The maintenance phase showed a higher level than both treatment and baseline. Coherence score data displayed a high upward trend line and ranged between +10 to +13 with an average of +11.00 ($SD = 1.73$).

Keith. Keith's coherence baseline data scores indicated a low, flat trend line, ranging from +1 to +3 and a mean of +2.43 ($SD = .79$). During the treatment phase, his scores demonstrated an immediate change in level from baseline. Coherence scores in the treatment demonstrated a flat trend line with low variability ranging between +5 to +7 and an overall level of +6.2 ($SD = .79$). The PND was 100% with no overlap of data points between the baseline and the treatment phase indicating high effectiveness of the intervention, and PEM also indicated high effectiveness with 100% of all data points exceeding the median of the baseline. In the maintenance phase, the mean coherence score was slightly lower than in treatment but clearly higher than in the baseline. Data displayed a downward trend line, which ranged between +4 to +7 with a mean of +5.33 ($SD = 1.53$).

Holistic Writing Quality

Holistic writing quality scores of essays were completed using a rubric-based evaluation of the overall quality of the composition based on a 9-point scale with 0 being the lowest and 9 being the highest quality of writing. Mean baseline holistic writing quality score across participants was 2.17 ($SD = .87$) with low variability, ranging from 1 to 3. The immediacy of effect change was evident in the treatment phase across all participants. An increased level change was also observed from baseline to treatment (see Figure 7). In the treatment phase, the mean score was 6.38 ($SD = 1.28$) and ranged from 4 to 8. The mean holistic writing quality score across participants was slightly lower than the treatment but remained markedly higher than the baseline. All participants, except Nate whose mean score was minimally higher, had an average score slightly less in the maintenance phase than in the treatment. The mean maintenance score was 5.5 ($SD = 1.78$) and ranged from 4 to 9. To determine the effects of the data, a visual analysis of the graphs of student results were used to assess within- and between- phase data for level, trend, variability, immediacy of effect, overlap, and consistency of data patterns. Based on the visual analysis of data (Figure 7), there is a strong evidence of a functional relation between the intervention and the holistic writing quality score.

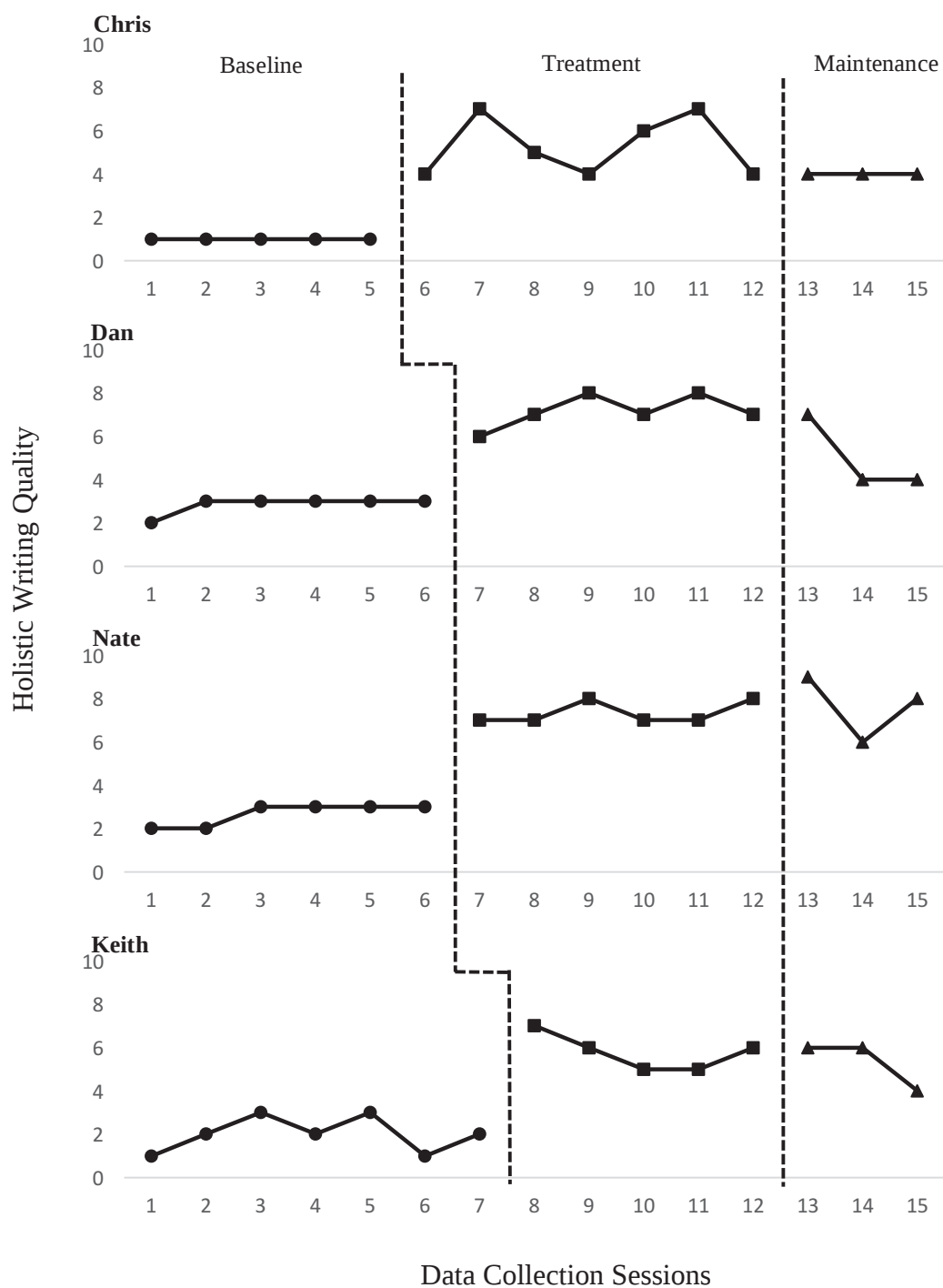


Figure 7. Holistic writing quality score. This figure presents the holistic writing quality score by participants in baseline, treatment, and maintenance.

Chris. Baseline data for holistic writing essay quality for Chris was low with no variability. He received a score of one across all five baseline sessions. During the treatment phase, data presented a rapid immediacy of change with a high-level change between the baseline phase and the treatment. The scores ranged from 4 to 7 with a level of 5.29 ($SD = 1.38$). Data in the treatment demonstrated a flat trend and a cyclical pattern of variability. Despite the visible variability, the PND was 100% with no overlap of data points between the baseline and the treatment phase indicating high effectiveness of the intervention. The PEM was also 100% with all data points exceeding the median of the baseline indicating of high effectiveness. In the maintenance phase, the mean quality writing score was lower than treatment but remained distinctly higher than in the baseline phase. Data displayed a flat trend line with no variability with the score of 4.

Dan. In the baseline phase, Dan's holistic writing quality scores were stable with low variability ranging between 2 to 3 with a mean score of 2.83 ($SD = .41$). Data presented an immediate effect change with a high-level change between baseline and treatment. There was a slight upward trend with low variability in scores ranging between 6 to 8 and an overall level of 7.17 ($SD = .75$). The PND was 100% with no overlap of data points, and PEM was also 100% with all data points exceeding the median of the baseline. Both indicate high effectiveness. In the maintenance phase, the mean score was lower than in treatment but higher than the baseline phase. Data displayed a downward trend line with moderate variability, with scores ranging between 4 to 7 and a mean of 5 ($SD = 1.73$).

Nate. The baseline holistic writing quality scores for Nate was stable ranging between 2 to 3 across six baseline sessions with a mean of 2.67 ($SD = .52$). An increased level between the baseline and the treatment was observed as well as an immediacy of effect. Scores in the treatment demonstrated a flat trend line with minimal variability ranging between 7 to 8 and a mean score of 7.33 ($SD = .52$). The PND was 100% with no overlap of data points between the baseline and the treatment phase, and the PEM was 100% with all data points exceeding the median of the baseline. Both PND and PEM indicated high effectiveness. The mean of maintenance phase scores was slightly higher than the treatment phase and markedly higher than the baseline. Data displayed a downward trend line, which ranged between 6 to 9 with an average of 7.67 ($SD = 1.53$).

Keith. Keith's baseline holistic writing quality scores indicated a flat trend line with low variability, ranging from 1 to 3 and a mean of 2 ($SD = .82$). During the treatment phase, data demonstrated an immediacy of change with a level increase from baseline to treatment. Scores in the treatment demonstrated a slight downward trend line and low variability with scores ranging between 5 to 7 with a mean 5.8 ($SD = .84$). The PND was 100% with no overlap of data points, and PEM was also 100% with all data exceeding the median of the baseline. These calculations indicate high effectiveness of the intervention. Mean score in the maintenance phase remained similar to the treatment but higher than the baseline phase. There was a downward trend line, and scores ranged between 4 to 6 with an average of 5.33 ($SD = 1.15$).

Summary of Scores

Across participants, the data scores of the essays indicate a functional relation

between the intervention and the number of words, number of sentences, number of transition words, functional essay elements, coherence, and holistic writing quality scores (see Table 7). The calculated PND resulted in high effectiveness at 100% across all participants except Nate who had 83.33% for number of words with one overlap of data point. In addition, the visual analysis of the graphs shows an immediacy of level change between the baseline phase and the treatment across all data measures. The participants' mean scores in the maintenance phase were able to remain above the baseline scores.

Table 7.

Summary of Participant Scores

Student	Baseline	Treatment	Maintenance	PND/PEM
Number of Words				
Chris	$M = 7.60$ ($SD = 1.52$)	$M = 48.43$ ($SD = 9.11$)	$M = 37.67$ ($SD = 8.74$)	$PND = 100\%$ $PEM = 100\%$
Dan	$M = 32.50$ ($SD = 7.15$)	$M = 95.00$ ($SD = 22.78$)	$M = 91.67$ ($SD = 22.03$)	$PND = 100\%$ $PEM = 100\%$
Nate	$M = 36.00$ ($SD = 13.52$)	$M = 103.83$ ($SD = 41.31$)	$M = 137.67$ ($SD = 19.50$)	$PND = 83.33\%$ $PEM = 100\%$
Keith	$M = 30.43$ ($SD = 6.60$)	$M = 68.00$ ($SD = 9.43$)	$M = 53.33$ ($SD = 9.29$)	$PND = 100\%$ $PEM = 100\%$
Number of Sentences				
Chris	$M = 1.00$ ($SD = 0.00$)	$M = 5.86$ ($SD = 0.38$)	$M = 4.33$ ($SD = .58$)	$PND = 100\%$ $PEM = 100\%$
Dan	$M = 2.50$ ($SD = .55$)	$M = 7.33$ ($SD = .52$)	$M = 7.00$ ($SD = 1.73$)	$PND = 100\%$ $PEM = 100\%$
Nate				

	$M = 2.33$ ($SD = .52$)	$M = 5$ ($SD = 0$)	$M = 5$ ($SD = 1$)	$PND = 100\%$ $PEM = 100\%$
Keith	$M = .86$ ($SD = .38$)	$M = 6.20$ ($SD = .45$)	$M = 5.67$ ($SD = .58$)	$PND = 100\%$ $PEM = 100\%$
Number of Transition Words				
Chris	$M = 0.00$ ($SD = 0.00$)	$M = 5.00$ ($SD = 0.00$)	$M = 3.67$ ($SD = .58$)	$PND = 100\%$ $PEM = 100\%$
Dan	$M = .17$ ($SD = .41$)	$M = 6.17$ ($SD = .41$)	$M = 6$ ($SD = 1.73$)	$PND = 100\%$ $PEM = 100\%$
Nate	$M = .33$ ($SD = .52$)	$M = 5.00$ ($SD = 0.00$)	$M = 5.00$ ($SD = 1.00$)	$PND = 100\%$ $PEM = 100\%$
Keith	$M = .29$ ($SD = .49$)	$M = 5.00$ ($SD = 0.00$)	$M = 3.67$ ($SD = .58$)	$PND = 100\%$ $PEM = 100\%$
Functional Essay Elements				
Chris	$M = 1.00$ ($SD = 0.00$)	$M = 5.57$ ($SD = .98$)	$M = 4.33$ ($SD = .58$)	$PND = 100\%$ $PEM = 100\%$
Dan	$M = 3.00$ ($SD = .63$)	$M = 7.00$ ($SD = .63$)	$M = 7.33$ ($SD = 1.15$)	$PND = 100\%$ $PEM = 100\%$
Nate	$M = 3.00$ ($SD = .63$)	$M = 7.83$ ($SD = 1.47$)	$M = 11.67$ ($SD = 2.08$)	$PND = 100\%$ $PEM = 100\%$
Keith	$M = 3.14$ ($SD = .90$)	$M = 7.00$ ($SD = .71$)	$M = 6.67$ ($SD = 1.15$)	$PND = 100\%$ $PEM = 100\%$
Coherence				
Chris	$M = 0.00$ ($SD = 0.00$)	$M = 4.14$ ($SD = 1.46$)	$M = 3.33$ ($SD = .58$)	$PND = 100\%$ $PEM = 100\%$
Dan	$M = 2.00$ ($SD = .63$)	$M = 5.67$ ($SD = 1.03$)	$M = 6.33$ ($SD = 1.15$)	$PND = 100\%$ $PEM = 100\%$
Nate	$M = 2.33$ ($SD = .52$)	$M = 6.67$ ($SD = 1.21$)	$M = 11.00$ ($SD = 1.73$)	$PND = 100\%$ $PEM = 100\%$
Keith	$M = 2.43$ ($SD = .79$)	$M = 6.20$ ($SD = .84$)	$M = 5.33$ ($SD = 1.53$)	$PND = 100\%$ $PEM = 100\%$
Holistic Writing Quality				

Chris	$M = 1.00$ ($SD = 0.00$)	$M = 5.29$ ($SD = 1.38$)	$M = 4.00$ ($SD = 0.00$)	$PND = 100\%$ $PEM = 100\%$
Dan	$M = 2.83$ ($SD = .41$)	$M = 7.17$ ($SD = .75$)	$M = 5.00$ ($SD = 1.73$)	$PND = 100\%$ $PEM = 100\%$
Nate	$M = 2.67$ ($SD = .52$)	$M = 7.33$ ($SD = .52$)	$M = 7.67$ ($SD = 1.53$)	$PND = 100\%$ $PEM = 100\%$
Keith	$M = 2.00$ ($SD = .82$)	$M = 5.80$ ($SD = .84$)	$M = 5.33$ ($SD = 1.15$)	$PND = 100\%$ $PEM = 100\%$

Chris and Keith both had scores across all measures that were relatively low in the baseline phase compared to Dan and Nate. Chris wrote one sentence essays while Keith primarily wrote a simple sentence with an opinion and a short explanation. When the MBGO was introduced, both Chris and Keith had a considerable increase in their mean across all measures. Although the mean scores of all measures during maintenance dropped slightly, scores continued to be above average baseline scores. Overall, compared to baseline, both Chris and Keith were able to write a more logical sequence of ideas relevant to the topic and use transition words appropriately to support their writing by the end of the study (see Table 8 for examples of their essays).

Table 8.

Examples of Chris and Keith's Essays

Baseline Essays: Write an essay about whether it is better to live in the country or the city.	
Chris	<i>It is better to live in country.</i>
Keith	<i>I think livening in the city's is cool because to get more friends and ride bike together so that what I will love to live in the city one day</i>
Treatment Essays: Write an essay about whether or not students your age should have a bedtime.	
Chris	<i>I think students should have bedtime. First, Feeling good when you get out on the right side of the bed. For example, I love sleeping. Next, It helps you to keep your body strong. One more, for a day I would sleep in. In summary, I think students should have bedtime.</i>
Keith	<i>I think we are to big to have bedtime. In the first place, 15 year old kids shouldn't have bed time b/c there to big. For example, kids get mad when they have to. Also, kids talk to mom and dad about there bedtime and not same everyday. In the same way, kids don't like bed time and fight there mom and dad. Again, I don't like bedtime a my age.</i>
Maintenance Essays: Write an essay about whether or not students your age should be able to choose their own teachers.	
Chris	<i>Yes I think they should choose their own teachers. First I love teachers. Also it can change your learning. so I think they should choose their own teachers.</i>
Keith	<i>I feel that we can choose are teacher. Firs he can think like us when we have school. He can have lot fun time with us. Also she or he can be the best. teachers are the best. So I feel that we can choose are teacher.</i>

Note. Spelling, spacing, and punctuation have not been altered from students' original composition. However, the font style and size have been changed.

Dan and Nate wrote between 2 to 3 sentences in their baseline phase, relatively more than Chris and Keith. Although their mean scores across all measures were higher than Chris and Keith's, the scores were relatively low compared to their scores in the treatment and the maintenance phase. Dan and Nate's baseline essays, while logical, were not developed and had limited information. With the use of the MBGO and learned strategies in the treatment phase, both Dan and Nate's average scores across all measures increased when the treatment was introduced. Unlike Chris and Keith, both Dan's coherence score and functional essay elements (5 out of 6 measures; 83.33%) in the maintenance phase presented improvements from the treatment. Nate's mean score for number of sentences and transition words remained the same from treatment to maintenance while his number of words, coherence, functional essay elements and holistic writing quality all improved from the treatment phase (4 out of 6 measures; 66.67%). Overall, both Dan and Nate's functional essay elements and coherence scores indicate that they were able to write a more logical sequence of ideas relevant to the topic and use transition words appropriately to support their writing (see examples of essays in Table 9).

Table 9.

Examples of Dan and Nate's Essays

Baseline Essays: Write an essay about whether or not athletes should have to finish college before playing a professional sport.	
Dan	<i>I think that kids should finish college and then go on to do a professional athlete. I reason I think that is because even though you're a professional athlete it doesn't mean that you have to stop being smart.</i>
Nate	<i>No they shouldn't because if you're good at the sport what will calculus do to help you to make that 3 pointer. But also like you should be somewhat educated on the sport you're playing .</i>
Treatment Essays: Write an essay on whether or not you should go to school on Saturdays.	
Dan	<i>I don't think kids should go to school on Saturday. To begin, It waste your time by going to school on because you might other stuff you have to do on Saturday. For example, Like a doctor appointment. Second, What if someone's going on a date on Saturday. For example, If you're having a date that person could be love of you life but since you have school on Saturday you can't make them it. Finally, It waste money from parents pocket because they have to pay for some kids. To summarize, I don't think kids should go to school on Saturdays.</i>
Nate	<i>Students should not go to school on Saturday. First, The students wouldn't want to go on a free day . For example, people would just skip school. Then, everyone will be mad and angry . In addition, if everyone is mad at school that will start fight. In summary, Students should not go to school on Saturday.</i>
Maintenance Essays: Write an essay about whether students should or should not be able to chew gum in school.	
Dan	<i>Kids should not have gum. First it can distract the kids around them. For example the kids would be worrying about the gum because someone is chewing loud. Second the kids could be asking to get a piece of it. For example the teacher could be talking and someone ask for a piece, that would just waste the teacher's time. To summarize kids should not have gum in school.</i>

I personally think students should chew gum in school this is why.

First Students need something to do when bored so instead of talking chewing gum can be that thing.

Secondly chewing gum researchers shows that chewing gum is actually a way of helping people calm down and makes them less stressed.

Nate

Third it's not like bringing in chips with those loud noises gum is silent not loud so it won't display bad behavior in the class. In addition chewing gum makes you less stressed about that big test and can make you focus more and makes you smarter so chewing gum is a A+ in my book.

To summarize I personally think students should be able to chew gum but not share it.

Note. Spelling, spacing, and punctuation have not been altered from students' original composition. However, the font style and size have been changed.

Use of Procedural Cues

Data was collected on the participants' use of procedural facilitation cues in the mobile-based graphic organizer (MBGO). During instruction, students were taught to use the seven self-questioning cues to generate ideas for reasons that support their opinion.

There were a total of 24 treatment sessions across all participants with Chris having seven, Dan and Nick having six each, and Keith having five sessions. With three cues selected during each writing session (one for each reason), a total of 72 cues were selected. Of the 72 cues, *mind* accounted for 22.2% ($n = 16$), *feelings* 19.4% ($n = 14$), *money* 8.3% ($n = 6$), *body* 9.7% ($n = 7$), *relationships* 12.5% ($n = 9$), *environment* 8.3% ($n = 6$), *time* 16.7% ($n = 12$), and *other* 2.8% ($n = 2$). A summary of participant cue

choices can be found on Table 10. Collectively, *feelings* was the most frequently chosen first cue ($n = 6$; 25%). For the second cue, *mind*, *feelings* and *relationships* were tied as the most frequently selected cues chosen at $n = 5$ (20.8%) each. Finally, the *mind* was the most frequently chosen third cue ($n = 9$; 37.5%).

Table 10.

Procedural Facilitation Cue Choices by Participant

Name	Cues								Total
	Mind	Feelings	Money	Body	Rel.	En.	Time	Other	
Chris	1	4	5	2	3	1	4	1	21
Dan	5	1	1	1	1	3	6	0	18
Nate	6	4	0	2	3	2	1	0	18
Keith	4	5	0	2	2	0	1	1	15
Total	16	14	6	7	9	6	12	2	72

Note. Rel. = relationship; En. = environment

The student essays were also assessed to determine whether or not (a) their procedural facilitation cues related to the reasons given, and (b) if they used the procedural facilitation cues as they were instructed, which was demonstrated by choosing a cue to generate ideas. Some student essays included three reasons that related to the cues, but the cues may not have been used appropriately in the essay. In other words, using cue appropriately indicates that the cue chosen was used to generate an idea. For

example, a student would choose the cue *money*, and for the reason would write “It will change my money.” In this situation, the reason was relevant to the cue, but the cue was not used to generate a relevant idea related to the opinion. For essays such as these, the researcher recorded each cue related to the reason (i.e., 3 *yes* for relevance – one for each reason), and recorded a non-appropriate use of the procedural facilitation in the essay (i.e., *no* for use). Therefore, there were 3 *relevance* and 1 *use* recorded for each treatment essay. As a group, 95% ($n = 65$) of the reasons related to the cues, 8.3% ($n = 6$) did not relate, and 1.4% ($n = 1$) were considered *other*. A summary by participants can be found in Table 10. For the appropriate *use* of procedural facilitation, as a group, 75% ($n = 18$) of the collective essays used them appropriately, 12.5% ($n = 3$) did not use them appropriately, and 12.5% ($n = 3$) were considered *other*. See Table 11 for a summary by participants. The essays and cues that were considered *other* will be further explained in the sections below.

Table 11.

Procedural Facilitation Cue Relevance by Participant

Name	Cue Relevant?			Total
	Yes	No	Other	
Chris	19	1	1	21
Dan	15	3	0	18
Nate	17	1	0	18
Keith	14	2	0	15
Total	65	7	1	72

Table 12.

Appropriate Use of Procedural Facilitation Cues by Participant

Name	Appropriate Use?			Total
	Yes	No	Other	
Chris	4	3	0	7
Dan	5	0	1	6
Nate	5	0	1	6
Keith	4	0	1	5
Total	18	3	3	24

Chris. Chris most frequently chose *money* ($n = 3$; 42.9%) as the procedural cue. The cues, *money*, *body*, and *relationships* were tied as the second most frequent cues chosen at $n = 2$ (28.6%) each. Finally, *time* was the third most frequently chosen cue ($n = 3$; 42.9%). Of the 21 cues, 90.5% ($n = 19$) of the reasons related to the cues, 4.8% ($n = 1$) did not relate, and 4.8% ($n = 1$) were considered *other*. One of the cues was recorded as *other* because he connected the reason to the cue, but weakly and not directly relate to it. More specifically, he chose *time* as a cue for identifying a reason to start school later in the morning, and his reason for the cue *time* was “so I can sleep in.” Whereas one may conclude that sleeping in requires more time, it was not explicitly stated. For the appropriate use of procedural facilitation, 57.14% ($n = 4$) of Chris’s essays used the cues appropriately, 42.9% ($n = 3$) did not use use appropriately, and 0% ($n = 0$) were considered *other*. In two of the essays considered to be not an appropriate use of

procedural facilitation, Chris simply re-stated the cue without further explanation. For the second *other*, he stated one of the other reasons for a cue already chosen.

Dan. David chose *time* ($n = 3$; 50%) most frequently as a cue. For the second most frequent cue, he selected *mind* ($n = 2$; 33.3%) followed by *body*, *relationships*, *environment* and *time* with one each (16.7%). Finally, *mind* and *time* cues were the third most frequently chosen cue at 33.3% ($n = 2$) each. Of the 18 cues, 83.3% ($n = 15$) of the reasons related to the cues, 16.7% ($n = 3$) did not relate, and 0% ($n = 0$) was considered *other*. The three cues that were considered not to be relevant to the reasons of the cues, however, it did relate to the other cues chosen. To illustrate, he would choose *mind* for the second cue but gave a reason relating to *time*, and for the third cue he would choose *time* but give a reason relating to *mind*. He explained in the session after completing the essay that he already knew which three cues he wanted to choose and had reasons for and did not feel it was important to do it in order. This explanation was recorded in the researchers' notes. Dan use the procedural facilitation appropriately in 83.33% ($n = 5$) of his essays, 0% ($n = 0$) did not use appropriately, and 16.7% ($n = 1$) were considered *other*. The appropriateness was considered *other* as it was evident that he already thought of his reasons and was simply trying to fit it into the cues instead of using the cues to generate ideas for his reasons.

Nate. Nate most frequently chose *body* as a cue ($n = 2$; 28.6%), and *mind*, *feeling*, *relationships* and *time* were all chosen once (16.7%). For the second most frequently selected cue, *mind*, and *feelings* were tied ($n = 3$; 50%). Finally, the *mind*, *relationships*, and *environment* cue were the third most frequently chosen cue at 33.3% (n

= 2) each. Of the 18 cues, 94.4% ($n = 17$) of the reasons related to the cues, 5.6% ($n = 1$) did not relate, and 0% ($n = 0$) was considered *other*. David use the procedural facilitation appropriately in 83.33% ($n = 5$) of his essays, 0% ($n = 0$) did not use appropriately, and 16.7% ($n = 1$) were considered *other*. The appropriateness was considered *other* as he used the cue *environment* in the social context instead of a physical environment. For example, for a reason as to why students should not go to school on Saturdays, he chose the cue *environment* and gave the reason that students will break out into fights. In this case, *relationship* cue would have been more appropriate.

Keith. Keith chose *feelings* and *relationships* most frequently at 40%($n = 2$) each as the first cue. For the second most frequently selected cue, *feelings* ($n = 2$; 40%) was chosen. Finally, the *mind* was the third most frequently chosen at 60% ($n = 3$). Of the 15 cues, 86.7% ($n = 13$) of the reasons related to the cues, 13.3% ($n = 2$) did not relate, and 0% ($n = 0$) was considered *other*. Similar to Dan, the two cues that were considered not relevant to the reasons of the cues related to the other cues chosen. Keith used the procedural facilitation appropriately in 80%% ($n = 4$) of his essays, 0% ($n = 0$) did not use appropriately, and 20% ($n = 1$) were considered *other*. The appropriateness was considered *other* he gave the cue *body* a different meaning. More specifically, to answer the question about whether students his age should have a bedtime, he chose the cue *body* and wrote that he is too “big” to have a bedtime. In this way, the meaning of Keith’s reason was that he was too “old” to have a bedtime, not that he’s physically too “big.”

Social Validity

After the final maintenance session, each of the four students was interviewed by the researcher one-on-one about their perception and knowledge of the interventions, including the strategies and their use of the MBGO.

When asked to recall the strategies used in the intervention, all of the students responded with IDEAS and/or the procedural facilitation cues. When asked further to recite the IDEAS mnemonic and the seven cues, all of the students were able to recall each with 100% accuracy. Although Chris expressed that he was only able to recall some of the cues, his attempt also yielded 100% accuracy. In the interviews, the four students expressed that they liked the MBGO and found it helpful in their writing. (Student comments can be found in Table 13.) Specific questions regarding the usefulness/helpfulness of the different components of the MBGO were asked (i.e., goal setting, brainstorming boxes, pop-up hints, main points column, transition-word drop-down menus, self-regulating checkboxes, and self-evaluation). All students expressed that the components should be kept as part of the MBGO. Dan and Nate stated that he never needed to use the hints, but may be beneficial keep it for other students. Overall, all four students found the MBGO not only helpful but easy to use. Nate further explained that the MBGO was overwhelming at first, but with the lessons and practices, he was able to use the MBGO without any difficulties.

Table 13.

Interview Comments on the MBGO

What did you like most about the graphic organizer?
<i>It helped me with my writing. In a lot of ways. (Chris)</i>
<i>It explains what you should do. It helps you out a lot and it seems easier for kids. (Keith)</i>
<i>It was easier than the bing, bang, bong. That one I hated that...they're all trash. This one was better because like the other ones are pull out your main idea. I was like no. But this one is like oh, put your idea, three reasons, summary, and elaborate with examples. That one is put your main idea. Write, draft, shut up. I like yours. It's quick, easy, simple. (Nate)</i>
<i>It was broken down instead of being together. It just showed like how it was laid out and stuff like that. (Dan)</i>
How do you think it (the graphic organizer) could help other students?
<i>By showing there are other reasons and not doing that reason over and over again. (Dan)</i>
<i>Because it shows especially if you don't know what you're doing. It shows you a big example for you. So when you start getting used to it you can use it over and over. (Keith)</i>
<i>Kids that do not like writing need to use this app because it will make you like writing a little bit more. Not a lot more, but it will make you like writing more. And it will help you become a better writer if you're sloppy writing. And like if you don't know how to use transition words correctly and you don't know how to like make the words fit together in the sentence and the sentence looks all jibber jabberish. Use this. Don't worry about it. (Nate)</i>
Is the graphic organizer easy or hard to use?
<i>It's just easy. It gives a big example....If you know what you're doing, if know it really well I think you can do it, but if you don't know it, it will help you a lot. (Keith)</i>
<i>Easy because you can plan it out before you write it down. (Dan)</i>
General comments

But I see how it's like useful. But if they give me [writing assignment], the only thing, I'll only plan my writing with your style. Before I used to just write and then write about something else and then go back to what I wrote about while there's something else write on there. I'll be like writing, oh yeah, this is my good topic. And then I switch over to that topic. But then like, oh, wait, this one. And then I'm too lazy to put, copy, paste, delete. (Nate)

All students shared positive statements when asked about the use of procedural facilitation cues. They stated that the cues were useful in helping them to generate ideas for the reasons in the essay. Moreover, when the MBGO was no longer available to them, as in the maintenance phase, they all still recalled and used the cues. Nate explained, *"It helps me get more ideas."* While Dan simply answered yes when asked if the cues helped him and if he used it when writing without the MBGO, other three students further explained how it was helpful. Chris expressed that prior to learning the cues, he *"didn't think of reasons at all"* but after learning the cues, he felt *"good."* Keith explained that he self-questioned the cues when writing by giving an example *"If you're thinking, let's say you have a question, but you've got to go one of those reasons and if you talk to yourself about your question....it's like a match, so I say I was like that person can be sad. That's a feeling."* Nate commented that the use of cues not only helped him write more ideas for reason and elaborations but provided a more positive experience of writing:

When I was writing, I felt like I could have written more if there were more determine reasons or like more elaborate. But if I was writing without it, before

that, writing was really boring and kind of stupid and like just a waste of my time.

It's still a waste of time, but I like it a little bit better now.

When asked about the instructional lessons, all four students felt nothing needed to be changed. However, they differed on what they perceived to be the most impactful lesson. Keith expressed that all four were helpful, Chris chose the lesson that introduced the use of the MBGO (Lesson 3), and Dan felt that the first lesson, which introduced the parts of a persuasive essay (opinions, reasons, elaborations/examples) and how they related, was the most useful. Nate responded, *"I think the cues helped the most. It was like the most important one."*

Students were asked to compare their planning habits before the study with their habits now following the use of the MBGO. The researcher explained planning as *"So do you start by planning in your head? Do you plan on paper? Do you not plan? Do you just start working right away? How do you start your writing assignment?"* The students' answers varied greatly. Chris stated that before the study he spent *"not much"* time planning his writing. When using the MBGO, he spent *"no"* time planning because it was already embedded in the MBGO for him, but spent more time writing the essay. Keith also responded that he spent *"not much"* time planning, but with the MBGO, he spent not only more time planning, but also more time writing. Dan commented that he spent less time writing and planning with the MBGO than without it. Nate did not plan before writing at all prior to the study because he did not like writing. After the intervention, he planned his writing for approximately five minutes. While he still did not enjoy planning, it was better with the MBGO saying, *"But I like your version. It's*

like oh, there's no vanilla ice cream so I'll take a strawberry." He preferred not to plan at all (vanilla), but if he must, he would use the MBGO (strawberry).

Finally, when asked about their confidence in writing a persuasive essay, the students all expressed that they felt more confident after learning the strategies and practicing with the MBGO than before the study. Given a scale between 1 to 10, with one being not confident to ten being most confident, each student rated themselves before the study and/or after the intervention. Chris felt he was a "zero" before the study, a "ten" with the MBGO, and a "five" without the graphic organizer. Keith rated himself an "eight" post-intervention and remarked "*Confident I can do it. I know I will do well on it. That would be awesome.*" Dan replied with the post-intervention confidence of "ten, no. Eight" and pre-intervention confidence of "five." And for post-intervention, Nate commented, "9.5. *I'm confident.*" But when asked how confident he was at the start of the study, he replied, "0.9, *negative.*"

Summary

The visual analysis of the data and the calculations of PND and PEM indicated that all four students improved their persuasive essays. The students wrote more words, sentences, and transition words, and scored higher in holistic writing quality. The students were able to produce more units of ideas (functional essay elements), and as indicated by the coherence score, the students were also able to write a longer, logical sequence of ideas.

Overall, the students demonstrated that they used the procedural facilitation cues to generate relevant ideas for their reasons to support their opinions, and used them as

instructed. The analysis of post-intervention interviews with the students suggests that the intervention was socially valid as all students expressed that their perceptions of the lessons, strategies, and the MBGO were positive and found the experience worthwhile. Chapter 5 will discuss broad findings and implications of the study.

Chapter Five

The purpose of the current study was to examine the functional relation between a mobile-based graphic organizer (MBGO) with embedded procedural facilitation cues and the persuasive writing performance of middle school students with emotional and behavioral disorders (EBD). The research questions (RQs) investigated through a single subject research design method in the study include:

1. Is there a functional relation between using a mobile-based graphic organizer with embedded procedural facilitators and improvements in the number of words, sentences and transition words of persuasive writing for middle school students with emotional and behavioral disorders?
2. Is there a functional relation between using a mobile-based graphic organizer with embedded procedural facilitators and improvements in the essay elements and coherence of persuasive writing for middle school students with emotional and behavioral disorders?
3. Is there a functional relation between using a mobile-based graphic organizer with embedded procedural facilitators and improvements in the holistic quality of persuasive writing for middle school students with emotional and behavioral disorders?
4. Do middle school students with emotional and behavioral disorders maintain the number of words, sentences, transition words, holistic

quality, functional elements and coherence in persuasive writing when a mobile-based graphic organizer is no longer available to them?

5. How do middle school students with emotional and behavioral disorders use the embedded procedural facilitation features in the brainstorming component when independently completing the mobile-based graphic organizer to write a persuasive essay?

Data analysis revealed that student participants were able to increase their holistic writing quality score (RQ #1), numbers of words, sentences, transition words (RQ #2), and functional essay elements and coherence score (RQ #3). Finally, students were able to maintain the increase in all measures when the MBGO was no longer available (RQ #5). Through the observation of procedural facilitation cues usage and post-intervention interviews, the analysis also concluded that the students not only used the cues with and without the MBGO but also found them to be useful generating ideas (RQ #4). Moreover, students were able to not only retain the strategies they embedded in the intervention, but they also stated that their experiences with the study were positive and worthwhile. This chapter will describe how the study extends previous studies, present major findings, implications on practice, limitations of the study, and suggestions for future research.

Extensions of Previous Studies

This study was a replication and extension of studies by Evmenova et al. (2016) and Regan et al. (2017) which used the WeGotIT! program computer-based graphic organizer with middle school students with high incidence disabilities. The current study extended the previous studies in five ways. First, the previous two studies (Evmenova et

al., 2016; Regan, 2017) used a Microsoft Word program as their computer-based graphic organizer (CBGO), whereas this study used the Apple application as the MBGO platform. Second, while the previous studies included students with high incidence disabilities and/or struggling writers in self-contained classrooms or co-taught classrooms, the participants in this study were students with emotional and behavioral disorders in a public day school setting. Third, modifications of the lessons were made, namely the first two lessons, which introduced the parts of a persuasive essay and their relationship to each other (Lesson 1) and the introduction and the use of procedural facilitation cues (Lesson 2). Lessons 3, 4, and 5 remained the same as the previous studies. Fourth, the current study included an additional strategy, procedural facilitation cues, in the instruction and embedded the cues in the graphic organizer to support idea generation for a reason related to the topic. And finally, two extra measures, functional essay elements, and coherence, were included in this study to analyze whether the students were able to produce more units of thoughts or idea and whether they were able to have a longer length of the logical sequence of ideas relevant to the topic.

Findings on Writing Performance

The essays written by the participants in the study yielded data that was analyzed for six measures: words, sentences, transition words, functional essay elements, coherence and holistic writing quality. Across all participants and measures, there were improvements from the baseline phase to the treatment phase, and maintenance phase was lower than the treatment but higher than the baseline.

Treatment phase writing performance. As mentioned previously, all students made significant positive gains from the baseline line phase to the treatment phase for the six measures analyzed from the essay data. Through visual analysis of graphs and the calculations of PND and PEM, a functional relation between the intervention and the measures were established. Findings were consistent with previous research (Evmenova et al., 2016; Regan et al., 2017). These studies researched the effects of the IDEAS graphic organizer, in the computer-based platform, on middle school students with disabilities and/or considered to be struggling writers. However, the research design differed. The current study had only four participants total with one student in the first tier, two in the second, and one in the third. Student data was presented by tier. The investigation by Evmenova et al. (2016) also had three groups with five participants in the first, three in the second and two in the third, which were presented as individual data as a group tier. The study by Regan et al. (2017) had seven students in the first tier, three in the second, and seven in the third. In their study, the mean performances of each group in a tier were presented. In other words, the scores were not disaggregated by participants, and only the mean scores were given on the graphs and in the table.

During baseline, the students were given a Microsoft Word document on an iPad with a choice of two prompts on the top of the page and a large blank box to write their essays. They were read scripted instructions and were given a 30-minute time limit. It is worth mentioning, however, that none of the students required the full 30-minutes. Chris wrote an average of 7.5 minutes, Dan 16.2 minutes, Nate 23.4 minutes, and Keith 17.1 minutes. After baseline, the students were provided four 45- to 50-min lessons, which

included an overview of the different parts of an essay and their relationship with each other, the use of procedural cues to generate ideas for reasons, guided practice of the MBGO, and independent practice of the MBGO. After the four lessons, the students were checked for mastery on the use of the MBGO. Then, the students transitioned to the treatment phase. In the treatment phase, the students were provided with the MBGO, read the instruction, and given 30 minutes to write an essay answering one of the two prompts provided to them on a separate iPad. This process, the baseline, lessons, and treatment followed the same procedures as the two previous studies (Evmenova et al., 2016; Regan et al., 2017) save for the content of the first two lessons. Although the procedures were the same, implementation of the intervention differed. In the current study, there was one implementer, the researcher, who had previous experiences with implementing the WeGotIt graphic organizers in middle school sites. In the study by Evmenova et al., multiple researchers implemented the CBGO for the first time. And finally, in the study by Regan et al. (2017), teachers of the participating students were the implementers of the intervention.

The data from the treatment phase indicated that all students demonstrated immediate improvements in their writing performances from the baseline data with 100% PND across all participants and measures, save for one data overlap by Nate in the number of words. The increases in the number of words and sentences of the students may be attributed to MBGO and the boxes for the placement of writing each part of the essay. All four students filled all the sentences boxes which resulted in at least six sentences. This encouraged more writing. The transition words were pre-determined by

the drop-down menu, which all four students remember to include when using the MBGO. This accounts for the large percent increase amongst all four students. Finally, the procedural facilitation cues and the effect of ideation was measured by essay elements and coherence. The positive percent change from baseline to treatment indicated that the use of cues helped students not only generate more ideas but the present cohesiveness of these ideas. The coherence scores indicated that students not only generated relevant reasons for their opinions but elaborations related back to the reasons.

The previous two studies investigating the use of the CBGO also saw gains in percent increase across the same four measures. The study by Evmenova et al. (2016) also scored for parts, but for comparison, it will not be included in this discussion. The percent increases in Evmenova et al.'s study (2016) were 138% for words, 194% for sentences, 1,461% for transition words, and 252% for holistic writing quality. Regan et al. (2017) had percent increases of 138% for words, 78% for sentences, 1,291% for transition words, and 168% for holistic writing quality. All three studies saw the greatest gains in transition words with over 1,000% increase. This may be explained due to the floor effect of students either having no or very few transition words in the baseline. With the exception of the holistic writing quality score in Evmenova et al.'s study, the current study showed the greatest percent increase across the measures. Table 14 presents the comparisons of the percent change of the three studies.

Table 14.

Study Comparison of Percent Increase from Baseline to Treatment

Study	Words	Sentences	Transition Words	Holistic Quality
Evmenova et al. (2016)	138%	194%	1,461%	252%
Regan et al. (2017)	78%	200%	1,291%	168%
Current Study	262%	328%	2,189%	237%

To assess the effectiveness of the intervention, PND and PEM were calculated in this study to determine the overlap of data points between the baseline and the treatment phase. The aggregate PND for number of words was 95.83%, number of sentences 100%, number of transition words 100%, functional essay element 100%, coherence 95.83%, and holistic writing quality 100%. The number of words and coherence had one overlap each which resulted in 95.83% PND. The two data points of overlap (one in words and one in coherence) were both from Nate's essay measures. All four measures, according to Scruggs and Mastropieri's (1998) evaluation criteria, indicated a high level of effectiveness. The aggregate PEM, percent overlap above the median that accounts for outliers was 100% which also indicated a high level of effectiveness of the intervention (Ma, 2005). These results exceeded the PND of the two previous studies. Evmenova et al. (2016) had an aggregate PND of 80% for number of words, 90% sentences, 100% transition words, and holistic writing quality. Regan et al. (2017) had 73% PND for

number of words, and 100% for sentences transition words and holistic writing quality. Both studies did not report PEM.

Other contributing factors. There were four possible contributing factors that may have resulted in the positive outcomes of the study. First, the intervention was implemented by the researcher instead of participants' English teachers. The researcher is experienced in conducting WeGotIt research studies with middle school student. Moreover, she helped create, in part, the lesson plans and the graphic organizer. The researcher's familiarity of the materials and the intervention procedures of research may have yielded in higher results than if implemented by the students' teachers (Boer, Donker, & van der Werf, 2014).

Second, the intervention took place one-on-one or two-on-one. This small implementer-to-student ratio allowed for constant, informal check for understanding and re-instruction of lesson components when needed. This ascertained that all the participants were able to master each lesson before moving on to the next. Also, having increased opportunities to respond due to the small ratio, provided the participants to be more engaged (Sutherland & Wehby, 2001). Moreover, the small implementer-to-student ratio afforded the researcher the flexibility to tailor the instruction to each student by taking into account processing speed of the participants, built-in breaks, and the learning environment.

Third, the researcher was mindful of cultivating relationships with the students. Students with EBD are reported to have a more positive outcome, behaviorally and academically, when a relationship with a "caring teacher" is developed (Mihalas, Morse,

Allsopp, & Alvarez McHatton, 2009). A “caring teacher” was described by Mihalas et al. (2009) as someone who takes an interest in students’ personal lives, invites the students to participate in their learning by providing choices and praises, asking for feedback, and actively listening. The researcher was mindful of these characteristics and actively pursued building positive relationships with student participants by spending time with them during homeroom, having one-on-one lunch with participants, volunteering to be a chaperone on a field trip, and providing praises in front of their teachers.

Maintenance phase writing performance. The maintenance phase occurred immediately after the treatment phase and the instruction of Lesson five. Lesson 5 guided student participants to use the strategies embedded in the MBGO and the other four lessons and apply it to writing when the MBGO with its embedded supports were no longer available.

The mean scores of the four students demonstrated decrease between the treatment and the maintenance on the number of words, number of sentences, number of transition words, and holistic writing quality. There was an increase in the number of essay elements and for coherence. All measures maintained above mean baseline scores.

Chris’s performance in maintenance was consistently less than treatment across all six measures. However, he was able to maintain above mean baseline scores in all measures. Dan’s performance decreased between treatment and maintained in number of words, number of sentences, number of transition words, and holistic writing quality. He had increases in essay elements and coherence. Despite the decrease in the four

measures, Dan was able to maintain average scores above the baseline. Nate's score decreased in number of words between treatment and maintenance, no change in number of sentences and in number of transition words, and an increase in essay elements, coherence, and holistic writing quality. He also maintained mean scores above the baseline. Finally, similar to Dan, Keith's scores decrease in all six measures. Like the other three participants, he was able to maintain above mean baseline scores in all measures.

While it may be assumed that in an effective single-subject research, students will decrease in their average scores when the intervention tools are taken away during maintenance, but remain above the baseline scores as Chris and Keith has demonstrated, Dan and Nate's scores not only remained above the baseline scores, but also above the treatment in at least two measures. Dan did not produce more words nor sentences in the maintenance compared to the treatment; however, he included more elaborations on each idea that resulted in higher essay elements and coherence. Nate's maintenance essays also had a detailed elaboration on his ideas for a reason for his opinions. In one sentence, Nate used multiple descriptors which were scored as separate essay elements. This, linked in relevance, led to a higher coherence score. However, since the number of sentences did not increase, the holistic writing quality scores did not improve. The holistic writing rubric takes into account discrete ideas in separate sentences. This is also reflected in Dan's score. Unlike Nate who maintained the same number of sentences, Dan slightly decreased in number of sentences which resulted in a larger negative percent change in holistic writing quality.

In general, students were able to recall cues, the mnemonic, and transition words to apply the strategy when the graphic organizer was no longer available to them. In the maintenance phase, across all the measures, all four students were able to maintain much of their scores from the treatment phase. This indicates that the intervention was successful for students to be able to independently generate same or similar quality of writing as without the support given in the treatment phase.

Findings on Student Use of Procedural Facilitation Cues

In the brainstorm box of the MBGO, student participants were given seven procedural cues plus *other* to choose from. The purpose of the cues was to aid in idea generation in writing. Currently, there is a gap in research on student ideation in writing (Crossley, Muldener, & McNamara, 2016), and the findings on the use of procedural facilitation contribute to the need of research in this area.

The order of the three most frequently selected cues were recorded for each essay. The two most frequently selected cues of all the students were *mind* and *feelings*, which accounted for 41.66% of the total cues ($n = 30$). Also, 90.00% ($n = 65$) of the cues (e.g., body, mind, etc.,) related to the reason provided by the students in the essays. And finally, of the 24 essays scored, 18 included appropriate uses of the cues by the students (90.27%).

Mind (22.2%; $n = 16$) was the most frequently chosen cue, but it was not the most frequently chosen first cue. Instead, *feelings* was the most frequently chosen first cue ($n = 6$; 25%), *mind*, *feelings*, and *relationships* were tied as the most frequent second cues with $n = 5$ (20.8%) each, and *mind* was the most frequently chosen third cue ($n = 9$;

37.5%). There are several potential reasons as to why participants frequently selected the *mind* and *feelings* cues. First, these were the first two cues introduced during instruction and listed on the MBGO and had a serial position effect on the students. This may have encouraged the students to choose these two cues. Second, these cues did not require students to have an extensive background knowledge to produce a reason. In other words, feelings and thoughts are personal experiences with which students were easily able to identify. The students were able to identify intuitive feelings toward the topic whether it be simply positive or negative. From there, the students were able to describe what incited the feelings toward the topic. Finally, the students had a general understanding of *mind*. Whereas, the researcher intended *mind* to reflect changes in knowledge or gaining of information, the students broadly used the term to represent any thoughts or effects on thinking and, at times, used it similar to the *feelings* cue. For example, when Dan responded to the prompt, *should students be allowed to chew gum in school?*, he selected the cue, *mind*. Then, in his essay, Dan wrote that students should be allowed to chew gum in school because students “*need something to do when they are [mentally] bored.*”

Of the 72 cues recorded, seven were considered not having relevance to the reason given in the essay (8.3%). Each student had a least one cue that did not relate to its reason. Chris’s had one non-relevant cue in which the reason for the cue chosen, *time*, was in support of the opposite opinion and was written in the main points column. In the sentences column, he reiterated a previously written reason. Dan had three non-relevant cues in which he did not match the order to the reasons. That is, he had chosen the three

cues without regard to the order of the reasons written. For example, his cue choice #1 related to the third reason, cue choice #2 to the first reason, and cue choice #3 to the second reason. Keith had two non-relevant cues that, like Dan, related to the other reasons given. The relevance of cue to reason informed how students used the cues. The 65 of the 72 cues recorded related to the reasons, and five out of seven of the non-relevant cues would not be an issue when writing outside of the MBGO as long as the cues are used to generate ideas that are relevant to the topic.

The appropriate use of the procedural facilitation cues was examined for each of the 24 essays written by the students in the treatment phase. Appropriate use was determined if the cues enabled the student participant to generate ideas for their reasons as they were instructed in Lesson 2. Eighteen essays (75%) utilized the cues appropriately, and three essays (12.5%) did not. Chris made all three occurrences of non-appropriate use of the cues. In two of his essays, he simply restated the cue as a sentence (e.g., *It can change my mind*) without generating and presenting any new idea. In the third essay, Chris chose *other* for the cue and restated one of his other reasons. There were three essays (12.5%) of the eighteen that used the cues to generate ideas, but with different interpretations. The prompt asked whether or not students should go to school on Saturday. The opinion “no” was supported by “.... *if everyone is mad at school that will start fight.*” The cue *environment* was chosen to generate this reason to mean social environment; however, in this case, *relationships* may have been more appropriate. In a separate essay, *body* was chosen by Keith as a cue to generate a reason for not having a bedtime. He stated he was too “*big*” to mean he was too old to be given a bedtime. Dan

wrote the third essay in which a cue was misinterpreted. In Dan's essay, the two reasons, although not repeated, were similar to one another, and had some relevance to the cues. For example, Dan chose the cue *environment* to support that students should not make the rules in school *"because the school will be in a lot of trouble."* The connection between the reason and the cue was present, albeit not a direct one. When asked how he selected the cues, Dan responded that he already had the ideas and chose cues that most closely related to them. However, his pre-determined reasons (i.e., cues not used to generate ideas) used in that particular essay repeated information. For example, the second reason was *"....it can affect the kids that are trying to do what they are supposed to do. For example, the kids that are doing what's right get in trouble because of the kids that are not doing what's right."* The third reason repeated the same idea, *"....if the kids are not doing what's right then you could also be in trouble with them."* So, although Dan was able to generate ideas without the cues, they were not discrete thoughts.

The appropriate use of the procedural facilitation cues brings a few considerations to the forefront. First, student motivation in writing is a factor. Chris consistently completed his treatment essays in less than ten minutes as he was motivated to finish his writing quickly. His frustration tolerance for writing was lower than the other students, and when he was unable to come up with an idea for a cue immediately, he either restated the cue or wrote repeated previous reasons. For less motivated students, they may benefit from extended modeling and guided practice and/or an extra lesson on idea generation to ascertain mastery of using cues appropriately and consistently. Second, the cues may have multiple meaning, and the student may use them in their interpretation. This would

not be an issue for them in their future writing if they were able to generate relevant ideas and consider the meaning of the cues as it was originally intended. Third, the procedural facilitation may be a helpful tool only when students have difficulty generating ideas. For higher level thinkers, procedural facilitation cues may be better used after they first generate ideas and find themselves stuck or need more ideas.

Social Validity

Data from post-intervention interviews with the participants revealed participants' perceptions of the MBGO, the lessons, the seven procedural facilitation cues, and their recall of the IDEAS strategy and the cues. The interviews indicated that all students had a positive perception of the MBGO, lesson, and cues, and all participants were able to recall all the parts of the IDEAS mnemonic and all seven cues.

Student perceptions of MBGO and the lessons. All four student participants stated that the MBGO was easy to use and that they did not need rely on the hidden pop-up and audio hints to help them when writing their essays independently. The students also felt that having the MBGO *“broken down instead of being together”* helped to facilitate that the writing process is *“quick, easy, [and] simple.”* All students felt that the MBGO had made them better writers, and would recommend the MBGO to other students because many students may benefit from them.

One observation made by the researcher was students' ease in using the iPad and its touchscreen capabilities. The students were able to use the MBGO interface with minimal guidance including opening the app by pressing on the icon, typing on the screen keyboard, changing the keyboard to type numbers and punctuation, moving the typing

cursor and pressing the home button key to close the app. This supports previous research that mobile platforms (e.g., iPad) are intuitive (e.g., simple design, compactness) and provide various interactive access to the curriculum (Cubelic & Larwin, 2014; Jaffarian, 2012). The high comfort level of students, in the current study, using touchscreen technology and/or user-friendliness of mobile-based technology, which may be a support for more integration of mobile technology in schools.

Idea generation. All students expressed that the procedural facilitation cues were a useful tool in helping them to generate ideas. They reported that they plan to continue using them in the future. Chris mentioned that before the intervention when given a prompt to write about, he was not able to think of anything, and thus refused to respond. This comment echoed his English teacher's narrative that he is an extremely reluctant writer and seldom completes writing assignments. And while the Chris responded well to the cues, he may have benefited from longer and more frequent guided practice. For Keith, he was able to identify his ideas to the cues, but had difficulty with clarity when communicating, especially in written form due to his language-specific learning disability. He struggled with producing words and organizing them into a clear idea. The cues allowed him to identify concretely which category his ideas belong. An example he gave was when describing someone who is sad; he can identify that it is a *feeling*. In other words, instead of starting with an example or elaboration, e.g., *sad*, Keith identified that a feeling was expressed and that the feeling was sadness.

Nate articulated in the interview that the cues helped with idea generation, especially in topics he did not have much background knowledge. He gave the example

of writing on the topic of whether or not to pass a law that requires one to wear a helmet when riding a motorcycle. Since he does not ride a motorcycle, he found the cues helpful to think of reasons like “*Buying a helmet is a lot of money, so it gives you a category like money.*” In addition, according to Nate’s English teacher’s narrative, he struggled to demonstrate cohesion in his thoughts when writing. However, Nate felt that MBGO and the cues helped him to write more cohesively. Nate explained that he would jump from idea to idea without regard to logical sequence. However, with the MBGO and the strategies learned, he was able to compose a cohesive essay with ideas that link with one another. This is reflected by Nate’s improvements in functional essay elements and cohesion scores from both baselines to treatment.

In general, all four students stated they did not have a strategy they used nor were they taught a strategy before this intervention for idea generation. They believe that the cues were helpful in thinking of reasons to support their opinion, and will continue to use the cues as a strategy to help them think of ideas in future writing.

Student knowledge of the strategies. The students were able to recall all the parts of the IDEAS strategy, and all seven procedural facilitation cues independently and without prompting. The researcher observed that frequent practice (each session began and often ended with reciting the IDEAS mnemonic and the seven cues) aided not only students’ recall, but also fluency. All students were able to recall both the mnemonic and the cues quickly and in order, except Chris who was not able to recite in order (i.e., IEDAS instead of IDEAS). Incidentally, when the cues were first presented, a corresponding motion for each cue was introduced. For example, using both index fingers

pointed at both side of the head to motion *mind*. Both Chris and Keith felt the motions helped with memorization of cues, and despite not performing the actual motions, they both periodically visualize the motions for recall.

Implications of the Study

This study contributes to the growing body of literature on academic interventions for students with emotional and behavioral disorders (EBD). Historically, more research has addressed behavioral interventions for students with EBD, for obvious reasons (Wehby, Lane, & Falk, 2003). However, it cannot be ignored the effects of academics on behavior and vice versa. Academic deficits of students with EBD must be addressed (Reid et al., 2004). This section will discuss the implications that the results of this study has on strategy instruction-based writing, procedural facilitation and idea generation for persuasive essays, technology-based graphic organizers, and mobile-based platforms for writing.

Strategy instruction. The current study adds to the existing body of literature on strategy instruction interventions for students with EBD. Strategy instruction is an evidence-based practice (Apichatabutra & Doabler, 2009) that provides explicit and direct instruction on the writing process. In a meta-analysis by Graham and Perin (2007), strategy instruction for students with disabilities yielded a high effect size ($ES = 0.82$). There have been two reviews (Ennis & Jolivette, 2014; Losinski, Cuenca-Carlino, Zablocki, & Teagarden, 2014) on research studies on students with EBD using self-regulated strategy development (SRSD), a widely researched type of strategy instruction for writing in the field of special education. Both reviews supported Graham and Perin's

earlier conclusions and demonstrated improvements in writing quality for students with EBD. The findings of this study are consistent with the reports of prior research on strategy instruction with high effectiveness in all measures including writing quality.

Procedural facilitation and idea generation. The current study also contributes to the emerging literature on procedural facilitation and idea generation. Chapter 3 presented a comprehensive literature review on the use of procedural facilitation in writing interventions. Of the 18 articles reviewed, three studies were conducted with students with EBD and the results varied with one study showing effectiveness, one as not effective, and one with mixed results. The current study's use of procedural facilitation is distinctive from previous studies in two ways: (1) cues to generate ideas, and (2) the cues were embedded in an intervention tool that was provided in a mobile-based platform instead of computer-based. Both distinctions for writing interventions, idea generation and mobile-based application, are in beginning stages of research with a dearth of studies published in special education (Crossley, Muldner, & McNamara, 2016; Sessions, Kang, & Womack, 2016). The results of this study are encouraging for improving the writing of students with EBD and merits further investigation of ideation, mobile-based interventions, and a combination of the two.

Mobile-based writing intervention. This study was a replication and extension of the former research, and the results add to the previous studies (Evmenova et al., 2016; Regan et al., 2017) involving the TBGO with embedded self-regulation strategies. The two studies used a computer-based graphic organizer (CBGO) and had determined the efficacy of using technology in writing interventions. Building on these findings, the

current study provides more evidence to already existing research on using a technology-based (both as a CBGO and MBGO) to support student persuasive essay writing.

Students are less likely to become distracted and engage more with the materials when using iPads in the classroom (Mango, 2015). This may be due to minimal time it takes to interact with the technology, due to fast the boot-up time (Hutchison, Beschorner, & Schmidt-Crawford, 2012) and the quick manipulation with the touch-screen. This was especially true for Nate, who was most engaged and motivated by the use of the iPad. During interviews, among the four students, Nate was most expressive about his fondness for the graphic organizer and the use of the iPad. He also had the strongest gains in treatment and maintenance.

Moreover, the current study also adds to the small number of mobile-based platform writing interventions which include using iPads for speech-to-text, word processing, homework, and a graphic organizer (Berninger et al., 2014; Dunn, 2014; Pilkington, 2012; Tanimoto et al., 2015). Mobile-technology based interventions are promising because they offer a unique set of benefits: mobility, personalization, user-friendliness, intuitive interface, and multiple modes of access to the curriculum (Alder & Fotheringham, 2012; Cubelic & Larwin, 2014; Jaffarian, 2012).

Generalization. Although the participants were chosen to be in the study for emotional and behavioral disorders as an inclusion criterion, it can be argued that the intervention would be beneficial to students with learning disabilities as well. All four students had a co-morbidity of emotional and behavioral disorder and a documented learning disability. Also, many of the components of the intervention such as graphic

organizers, strategy instruction, use of technology, mnemonic, and procedural facilitation have evidenced to be effective with students with learning disabilities. Therefore, this intervention may be generalized to the instruction of students with learning disabilities.

Limitations of the Study

There are several limitations to this study. First, the sample size was relatively small. Although the single-subject design does not require a minimum number, the study must be replicated multiple times to address internal validity threats (What Works Clearinghouse, 2010). Also, despite the detailed description of participant characteristics, including behavioral and writing profiles, it cannot be assumed that the findings in this study can be generalized to other populations.

Second, the overall length of the study took place over a short period of time. Due to external time constraints, the study lasted only five weeks. To accommodate this accelerated period of data collection, there were times when two sessions transpired in one day to make up for a session missed by a student due to either an absence (Nate only) or a field trip (all four students).

Third, the loss of baseline video recordings as detailed in Chapter 3 was also a limitation of this study. Although the loss of the videos had minimal impact on the overall result of the study, fidelity for the baselines could not be established.

Fourth, the researcher collected all of the data and served as the interventionist for the study. This is not unique. A majority of intervention studies have researchers or researchers' assistants providing the intervention. However, Ennis and Jolivet (2014) recommend having teachers, who have had extensive professional development training,

serve as interventionists for writing research studies. Previous research has shown that successful results are possible for writing instruction interventions to be conducted by teachers in an authentic classroom setting (Cuenca-Carlino & Mustian, 2013; Regan et al., 2017).

Fifth, as mentioned previously, the students may have perceived the boxes provided in the MBGO to type in to be limiting. This may explain Nate's increase in number of words when the MBGO was taken away and he was provided a blank document. Also, the MBGO could not be enlarged which created some difficulty when students tried to move the cursor to the text box box or copy and paste words into different boxes.

Finally, maturation posed a threat to internal validity (Kratochwill et al., 2010). In the current student, there were at least five data sessions in each baseline and treatment phase. The sessions in each phase were conducted following the same procedure, including reading a script for instruction. Identical conditions were provided. Maturation occurs when time or duration of the study is a factor, not the intervention (Kratochwill et al., 2010). The researcher had to consider the possibility of maturation as students with EBD typically have a lower frustration tolerance for non-preferred activities, especially those that are redundant or repeated. In a few incidences, namely Chris and Keith, frustration was expressed with the rote procedure, however; it quickly subsided after a five-minute break before the start of each session, as needed.

Suggestions for Future Research

Further replication and extensions of this study are recommended to strengthen the internal validity of this research and to provide more evidence towards the generalization of the intervention's effects. The current study was able to establish a functional relation of writing performance and the MGBO with embedded procedural facilitation cues, and merits further investigation to determine, along with results from past two studies (Evemenova et al., 2016; Regan et al., 2017) of which this study was designed after, if it can be considered as an evidence-based practice for students with EBD. However, there are a few suggestions for future research.

First, future research should extend the current study by providing a multi-paragraph MBGO with embedded procedural facilitation cues. While mastering a one-paragraph essay with a logical sequence of thoughts is an important first step in becoming a proficient writer, the high stakes writing tests that are given state-wide, such as the Common Core State Standards (CCSS), require students to write multiple-paragraph essays. Furthermore, having a multi-paragraph MBGO would allow for differentiating the diverse level of writers exhibited in one classroom.

Second, future research should modify the wording of the seven cues to be age-appropriate. The cues may still be used across different age groups, but with minor changes. For example, for high school students, "economic impact" may be substituted for "money," and substitute "*change*" with "affect." In addition, the beginning phrase, *How does it change your* can be modified by dropping the word "your" for clarity, to accommodate students who may be influenced by such nuances. To explain, in one of

Chris' essay practices, Chris responded to the question of wearing uniforms to school, that wearing uniforms did not change his money. However, Chris failed to recognize that wearing uniforms would change his parent's money. The other three students were not affected by semantics.

Third, future research should conduct a study on using the procedural facilitation cues independently from the MBGO to determine how much of the results were affected by the MBGO and how much by the cues. As mentioned previously, idea generation research is absent in the literature. When teachers direct students to think of reasons or "brain dump," it is assumed that the skill of generating ideas has already been acquired. However, it is not a simple cognitive exercise. Rather, it requires a higher level of thinking. More studies need to be conducted on strategies that can aid students in triggering these thoughts and ideas when planning for writing.

And finally, more in-depth interview questions should be asked of the participants about the use of the MBGO. This would be especially beneficial if asked immediately after writing each essay. Questions asked should include the reasoning behind the choices of the cues, and students should be given immediate feedback on their use of the MBGO. This timely inquiry will provide more insight into the thought processes of the students.

Conclusion

This study, a replication and extension of Evmenova et al., (2016) and Regan et al. (2017), investigated the use of an MBGO with IDEAS strategy and embedded procedural facilitation cues. Findings demonstrated improvements in persuasive writing

performance for four students with EBD. Furthermore, the improvements were maintained. Use of a mobile-based learning platform along with the use of cues to generate ideas contributes to the growing body of literature on writing interventions for students with EBD. Also, social validity data suggests that students not only perceived the MBGO as a beneficial tool for themselves but would recommend the tool to other students, as well. The results of this study are promising and merit further exploration into the integration of mobile-technology and systematic instruction of ideation to support writing for students with EBD.

Appendix A

IRB Approval Letter



Office of Research Integrity and Assurance

Research Hall, 4400 University Drive, MS 6D5, Fairfax, Virginia 22030
Phone: 703-993-5445; Fax: 703-993-9590

DATE: August 2, 2016

TO: Anna Evmenova
FROM: George Mason University IRB

Project Title: [477498-5] Project WeGotIT!: Writing Efficiently with Graphic Organizers - Teachers Integrating Technology

Reference: 8418 / OSP #113030

SUBMISSION TYPE: Amendment/Modification

ACTION: APPROVED

APPROVAL DATE: August 2, 2016

EXPIRATION DATE: March 21, 2017

REVIEW TYPE: Expedited Review

REVIEW TYPE: Expedited review category #7

Thank you for your submission of Amendment/Modification materials for this project. The George Mason University IRB has APPROVED your submission. This submission has received Expedited Review based on applicable federal regulations.

Please remember that all research must be conducted as described in the submitted materials.

Please remember that informed consent is a process beginning with a description of the project and insurance of participant understanding followed by a signed consent form. Informed consent must continue throughout the project via a dialogue between the researcher and research participant. Federal regulations require that each participant receives a copy of the consent document.

Please note that any revision to previously approved materials must be approved by the IRB prior to initiation. Please use the appropriate revision forms for this procedure.

All UNANTICIPATED PROBLEMS involving risks to subjects or others and SERIOUS and UNEXPECTED adverse events must be reported promptly to the Office of Research Integrity & Assurance (ORIA). Please use the appropriate reporting forms for this procedure. All FDA and sponsor reporting requirements should also be followed (if applicable).

All NON-COMPLIANCE issues or COMPLAINTS regarding this project must be reported promptly to the ORIA.

The anniversary date of this study is March 21, 2017. This project requires continuing review by this committee on an annual basis. You may not collect data beyond this date without prior IRB approval. A continuing review form must be completed and submitted to the ORIA at least 30 days prior to the

anniversary date or upon completion of this project. Prior to the anniversary date, the ORIA will send you a reminder regarding continuing review procedures.

Please note that all research records must be retained for a minimum of five years, or as described in your submission, after the completion of the project.

If you have any questions, please contact Bess Dieffenbach at 703-993-5593 or edieffen@gmu.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within George Mason University IRB's records.

Appendix B

Parent Consent and Student Assent



George Mason University
(703) 993-5256; FAX: (703) 993-3681
Email: aevmenov@gmu.edu



Parent Permission for Participation in Research: Informed Consent

Project Title: Project WeGotIT!: Writing Efficiently with Graphic Organizers - Teachers Integrating Technology

Purpose: This study is being conducted to investigate the effectiveness of technology-based graphic organizers and self-regulated learning strategies on the essay writing and writing fluency performance of 3rd-12th grade students across subject areas (language arts, science, and social studies).

Project Requirements: Your child's teacher may or may not be using some new methods to teach writing persuasive, narrative, and expository essays during language arts, science, and social studies classes. The university researchers developed these methods based on the best practices from research. We would like to compare students' performance in the class that uses new methods to those who are taught in a regular way. Your child's teacher may or may not receive training in the writing strategy instruction. As a result your child may receive this new instruction or continue to receive their usual writing instruction. This will allow us to evaluate the effects of this strategy instruction.

The project covers the regular classroom curriculum that targets improving written expression. Your child's teacher will be trained to teach the writing strategy and test your child's writing performance. These tests will include test scores from their essays written in class, and test scores from writing tests, including Writing Fluency, a subtest under Broad Written Language of the *Woodcock Johnson Achievement Battery*.

We will be watching and videotaping some of your child's writing tasks this year. We would like permission to include your child in these videotapes. We are studying how teachers implement and how students use technology during writing. We would also like to ask your child some questions about using technology for writing and audio record their responses. These questions will take only a few minutes of your child's time, and will not interfere with any other classroom activities. We would like to give your child writing opportunities with technology to evaluate how well the writing instruction impacts their performance.

We would also like to look at some of your child's school records. This includes test scores from existing school records of standardized tests, including SOL achievement scores, disciplinary and attendance records, as well as IEP writing goals (if applicable). Any information collected, including videotapes, audiotapes, and test scores, will be kept confidential by maintaining all materials in locked files and offices accessible only to project staff, and viewed only by project staff. Once the information is collected, student numbers will be assigned, and identifying



Project Number: 477498-6
Date Approved: 4/7/17
Approval Expiration Date: 4/6/18

IRB: For Official Use Only

Page 3 of 7

information will be discarded. The video recordings will be erased 5 years after the project's conclusion.

An assent form was distributed to your child. At that time, the information contained in this letter and their assent form was described and any questions were answered. Students were encouraged to take their forms home and discuss the project with you before signing them and returning them to a designated place in the school. If you choose not to participate in the study, your child will complete scheduled classroom activities while other students participate in the research procedures.

Foreseeable Risks: There are no foreseeable risks or discomforts.

Voluntary: You and your child's participation is voluntary, and you and your child may withdraw from the study at any time, even after signing the consent and assent forms, for any reason. There is no penalty for not participating or withdrawing.

Benefits: The personal benefits for participation may include improved written expression performance.

Costs: There are no costs to you, your child, or their teachers.

Confidentiality: All data collected in this study will be confidential; all person-identifiable data will be coded so that no one, including individual students, parents, teachers, schools, or districts can be identified.

Researchers: This study is being conducted by Dr. Anna Evmenova, Dr. Kelley Regan, and the team of doctoral students from College of Education and Human Development at George Mason University (GMU). You can reach them at telephone number: 703-993-3670 for questions or complaints.

You may also contact the GMU Office of Research Integrity & Assurance at 703-993-4121 if you have questions or comments regarding your rights as a participant in this research. This project has been reviewed according to George Mason University procedures governing your participation in this research.

If you agree to the information described above and will allow your child to participate in the research, please print your child's first and last name below and sign both copies of the parental consent forms provided. Then, please return one signed copy to your child's teacher **within 10 days of receiving the information about the research**.

I have read this form and agree for my child to participate in the study:

☐ Agree to participate in the study

☐ Do NOT agree to participate in the study



Project Number: 477498-6
Date Approved: 4/7/17
Approval Expiration Date: 4/6/18

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Page 4 of 7



George Mason University
(703) 993-5256; FAX: (703) 993-3681
Email: aevmenov@gmu.edu



Student Permission for Participation in Research: Assent Form

Project Title: **Writing Instruction**

RESEARCH PROCEDURES

This study is to find out if computers help students write better papers. Your teacher may be using use graphic organizers on the computer and some new methods to teach writing. Your teacher will be giving you some tests to measure your writing skills.

We will be watching some of those classes this year. We would like to videotape you during classes. We will watch the videotape to see the writing lessons in your class. We would like to ask you questions about using technology for writing instruction. We would like to look at some of your written papers and test scores. We would like to look at some scores from your school records. Asking you questions will take only a few minutes of your time. This will not get in the way with any other classroom tasks.

RISKS AND BENEFITS

Nothing bad will happen to you if you do or do not take part in this study. There are no rewards or money paid for being in this study. We may find out things to help us prepare teachers to teach students how to write better. You might also learn how to write better papers.

CONFIDENTIALITY

Your name will not be used. Your own test scores will not be used when we write our reports. We will never tell anyone who you are. We may use some of your words when we write our report, but we will never put your name to these words.

PARTICIPATION

You don't have to talk to us if you don't want to. If you change your mind after we start talking and want to stop that is OK. We will not get mad and nothing will happen to you.



Project Number: 477498-6
Date Approved: 4/7/17
Approval Expiration Date: 4/6/18

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CONTACT

Our names are Anna Evmenova and Kelley Regan. We are professors at George Mason University. You can call us if you have any questions about this study. Anna's phone number is 703-993-3652. Kelley's number is 703-993-9858.

The Office of Research Integrity & Assurance at George Mason University (GMU) knows all about our research. They said that it was OK for us to do it. You can call GMU at 703-993-4121 if you have any questions about being a part of this research.

CONSENT

I have read this form and I agree to be part of this study.

☐ Agree to participate in the study ☐ Do NOT agree to participate in the study

I consent to the video recording of the instruction and my audio-recorded interviews. I understand that any video/audio recordings will be kept confidential:

☐ Agree to video/audio recording ☐ Do NOT agree to video/audio recording

Name (print)

Signature



Project Number: 477498-6
Date Approved: 4/7/17
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Appendix C

Screenshot of the MBGO

iPad 8:53 PM 58%

Start Over Fill In Chart :20

Name: No Name Date: 2017-07-01 20:52:27

Prompt

Note the prompt here.

1 Pick your goal: I will include 3 reasons and 3 examples.

Brainstorm How does it change your:

Prompt1 Prompt2 Mind Money Relationships Time

Feelings Body Enviroment Other All Done

	Main Points	Sentences	Check your work!
I dentify your opinion		Click here to enter text.	☐ I included my opinion.
D etermine 1st reason		Choose an item, click here to enter text.	☐ I included 3 reasons to support my topic.
E laborate with example	Click here to enter text.	Choose an item, click here to enter text.	
D etermine 2nd reason		Choose an item, click here to enter text.	☐ I have as many examples as I planned to have in my goal.
E laborate w/ example	Click here to enter text.	Choose an item, click here to enter text.	
D etermine 3rd reason		Choose an item, click here to enter text.	
E laborate w/ example	Click here to enter text.	Choose an item,	
A dd transition words as you go!			☐ I have transition words.
S ummarize	Click here to enter text.	Choose an item, click here to enter text.	☐ I summarized my opinion.

3 Next, copy the text in the orange box.

Name: No Name

Date: 2017-07-01 20:52:27

4

Read your essay and edit it.

Touch [here](#) to see how your final essay should look.

5

Evaluate:

1. How many words do I have in my essay?
2. How many sentences do I have in my essay?
3. How many reasons do I have in my essay?
4. How many examples do I have in my essay?
5. Do all my sentences make sense?
6. How do I feel about my essay:   
7. My next goal is:

Feedback: You have included
in your essay, which makes you a great writer!

[Email](#)[Print](#)[Preview](#)[Start Over](#)

Appendix D

LEARN Lesson Plan Template

LEARN Model Lesson Template

Lesson 1 Objective:

Materials Needed:

Component	Time Allotment	Description
Link		
Engage and Educate Active Learning Reflect		
Now and Then		

Appendix E

Fidelity Checklists



Project WeGotIt!: Writing Efficiently with Graphic Organizers – Teachers Implementing Technology

Baseline Implementation Fidelity Checklist

Researcher: _____ Student(s): _____

Period/Condition: _____ Date: _____

Note: Mark each step completed or not completed by the teacher/researcher. The fidelity of treatment will be calculated by dividing the number of steps completed by the number of steps planned. A separate checklist is to be completed by each observer.

	Yes	No
1. Ensures that iPad is open and on.	☐	☐
2. Ensures camera is recording with student/lesson/class visually presented.	☐	☐
3. Provides directions to the students according to the script.	☐	☐
4. Provides the prompts on the board/screen or on paper.	☐	☐
5. Reads out loud the prompts for the students.	☐	☐
6. Provides only technical assistance (if the iPad is malfunctioning).	☐	☐
7. Does NOT provide any help with spelling or ideas for writing (e.g., just do your best).	☐	☐
8. Does NOT prompt students to start/continue writing.	☐	☐
9. When a student is done, shows how the file should be saved (if needed)	☐	☐
10. Ensures that a student saved the file correctly.	☐	☐



Project WeGotIt!: Writing Efficiently with Graphic Organizers – Teachers Implementing Technology

Treatment Implementation Fidelity Checklist

Researcher: _____ Student(s): _____

Period/Condition: _____ Date: _____

Note: Mark each step completed or not completed by the teacher/researcher. The fidelity of treatment will be calculated by dividing the number of steps completed by the number of steps planned. A separate checklist is to be completed by each observer.

	Yes	No
1. Ensures that iPad is open and on.	☐	☐
2. Ensures camera is recording with student/lesson/class visually presented.	☐	☐
3. Provides directions to the students according to the script.	☐	☐
4. Provides the prompts on the board/screen or on paper.	☐	☐
5. Reads out loud the prompts for the students.	☐	☐
6. Provides only technical assistance (if the iPad is malfunctioning).	☐	☐
7. Does NOT provide any help with spelling or ideas for writing (e.g., just do your best).	☐	☐
8. Does NOT prompt students to start/continue writing.	☐	☐
9. When a student is done, shows how the file should be saved (if needed)	☐	☐
10. Ensures that a student saved the file correctly.	☐	☐



Project WeGotIt!: Writing Efficiently with Graphic Organizers – Teachers Implementing Technology

Maintenance Implementation Fidelity Checklist

Researcher: _____ Student(s): _____

Period/Condition: _____ Date: _____

Note: Mark each step completed or not completed by the teacher/researcher. The fidelity of treatment will be calculated by dividing the number of steps completed by the number of steps planned.

	Yes	No
1. Ensures that iPad is open and on.	☐	☐
2. Ensures camera is recording with student/lesson/class visually presented.	☐	☐
3. Provides directions to the students according to the script.	☐	☐
4. Provides the prompts on the board/screen or on paper.	☐	☐
5. Reads out loud the prompts for the students.	☐	☐
6. Provides only technical assistance (if the iPad is malfunctioning).	☐	☐
7. Does NOT provide any help with spelling or ideas for writing (e.g., just do your best).	☐	☐
8. Does NOT prompt students to start/continue writing.	☐	☐
9. When a student is done, shows how the file should be saved (if needed)	☐	☐
10. Ensures that a student saved the file correctly.	☐	☐



Project WeGotIt!: Writing Efficiently with Graphic Organizers – Teachers Implementing Technology

Lesson 1 Fidelity Checklist

Researcher: _____ Student(s): _____

Period/Condition: _____ Date: _____

Note: Mark each step completed or not completed by the researcher. The fidelity of treatment will be calculated by dividing the number of steps completed by the number of steps planned.

	Yes	No
1. Ensures that iPad is open and on.	☐	☐
2. Ensures camera is recording with student/lesson/class visually presented.	☐	☐
3. Ensures that all materials have been given to students.	☐	☐
4. Ensures that PowerPoint is followed throughout lesson.	☐	☐
5. Reads through agenda and key words (students check off completed items).	☐	☐
6. Activate background knowledge with a discussion of a print ad.	☐	☐
7. Instructs on the relationships of opinion, reasons, and examples.	☐	☐
8. Students practice their own of above.	☐	☐
9. Instructs IDEAS strategy.	☐	☐
10. Students Practice with MBGO	☐	☐
11. Students complete Exit ticket	☐	☐
12. Collects completed handouts and ensures that files are saved/transferred.	☐	☐



**Project WeGotIt!: Writing Efficiently with Graphic Organizers –
Teachers Implementing Technology**

Lesson 2 Fidelity Checklist

Researcher: _____ Student(s): _____

Period/Condition: _____ Date: _____

Note: Mark each step completed or not completed by the researcher. The fidelity of treatment will be calculated by dividing the number of steps completed by the number of steps planned.

	Yes	No
1. Ensures iPad is open and on.	☐	☐
2. Ensures camera is recording with student/lesson/class visually presented.	☐	☐
3. Ensures that all materials have been given to students.	☐	☐
4. Ensures that PowerPoint is followed throughout lesson.	☐	☐
5. Reads through agenda and key words (students check off completed items).	☐	☐
6. Reviews IDEAS strategy and relationship between IDE.	☐	☐
7. Instructs on using cues to generate ideas for reasons.	☐	☐
7. Instructs on using motions to remember cues.	☐	☐
8. Students practice their own of above.	☐	☐
9. Instructs on using cues with MBGO	☐	☐
10. Students practice with MBGO	☐	☐
11. Students complete Exit ticket	☐	☐
12. Collects completed handouts and ensures that files are saved/transferred.	☐	☐



**Project WeGotIt!: Writing Efficiently with Graphic Organizers –
Teachers Implementing Technology**

Lesson 3 Fidelity Checklist

Researcher: _____ Student(s): _____

Period/Condition: _____ Date: _____

Note: Mark each step completed or not completed by the researcher. The fidelity of treatment will be calculated by dividing the number of steps completed by the number of steps planned.

	Yes	No
1. Ensures that iPad is open and on.	☐	☐
2. Ensures camera is recording with student/lesson/class visually presented.	☐	☐
3. Ensures that all materials have been given to students.	☐	☐
4. Ensures that PPT is followed throughout lesson.	☐	☐
5. Reads agenda and instructs students to check off completed items.	☐	☐
6. Instructs students to complete warm up.	☐	☐
7. Models IDEAS +PF organizer with student input as students complete as well.	☐	☐
8. Highlights features of graphic organizer stressing that they are working to become better writers by using the IDEAS strategy and PF cues.	☐	☐
9. Guides students to provide ideas for the completion of all parts in the mobile-based graphic organizer.	☐	☐
10. Instructs students to find the missing parts as their lesson wrap up.	☐	☐
11. Collects completed handouts and ensures files are saved.	☐	☐



**Project WeGotIT!: Writing Efficiently with Graphic Organizers –
Teachers Implementing Technology**

Lesson 4 Fidelity Checklist

Researcher: _____ Student(s): _____

Period/Condition: _____ Date: _____

Note: Mark each step completed or not completed by the researcher. The fidelity of treatment will be calculated by dividing the number of steps completed by the number of steps planned.

	Yes	No
1. Ensures that iPad is open and on.	☐	☐
2. Ensures camera is recording with student/lesson/class visually presented	☐	☐
3. Ensures that all materials have been given to students.	☐	☐
4. Ensures that PowerPoint is followed throughout lesson.	☐	☐
5 Reads agenda and instructs students to check off completed items.	☐	☐
6. Instructs students to complete warm up.	☐	☐
7. Provides a review of the mobile-based graphic organizer as needed.	☐	☐
8. Instructs students to complete the mobile-based graphic organizer independently.	☐	☐
9. Collects completed handout and agenda and ensures files are saved.	☐	☐
10. Completes mastery checklist	☐	☐



Project WeGotIT!: Writing Efficiently with Graphic Organizers – Teachers Implementing Technology

Lesson 5 - Maintenance Fidelity Checklist

Researcher: _____ Student(s): _____

Period/Condition: _____ Date: _____

Note: Mark each step completed or not completed by the researcher. The fidelity of treatment will be calculated by dividing the number of steps completed by the number of steps planned.

	Yes	No
1. Provides and reviews handout with agenda/warmup to students.	☐	☐
2. Ensures camera is recording with student/lesson/class visually presented.	☐	☐
3. Instructs students to complete warm up.	☐	☐
4. Review strategy/cue and parts of MBGO reinforcing student recall as needed.	☐	☐
5. Researcher poses question: What if you didn't have the MBGO?	☐	☐
6. Prompt choices visible.	☐	☐
7. The prompts are read out loud.	☐	☐
8. Researcher thinks out loud how to 'recreate' the graphic organizer.	☐	☐
9. Researcher leads students to brainstorm each part of the strategy.	☐	☐
10. Researcher leads students to generate sentences from the brainstorm.	☐	☐
11. Researcher leads students to evaluate the completed essay for all parts.	☐	☐
12. Researcher asks students if they are ready to try 'the challenge' out on their own.	☐	☐

Appendix F

Mastery Checklist

Mastery Criterion Checklist (Observational Protocol)

Directions: This checklist serves as the mastery criterion for exiting the practice sessions. This checklist should be completed for each target student. It will be used to determine if the student "meets criterion" to move forward to posttest and/or requires booster/remediation sessions for completing the graphic organizer. That is, is there a part they are unable to do or require major help doing? Do they show clear understand of all the components? More importantly, are they able to independently use the MBGO without any help? Observe the student completing the next steps. Ask the student questions if unable to observe the actions.

Observational Checklist

1. The student consistently completed all activities from Lessons 1-4 with at least 90% accuracy (please review students notebooks):
☐ Yes ☐ No
2. The student consistently and independently chooses only one of the prompts to respond to:

Chooses incorrect/two prompts	Needs reminders to choose one prompt	Chooses one of the prompts independently
-------------------------------	--------------------------------------	--
3. The student consistently and independently chooses the goal before any writing:

Does not know how to choose the goal	Needs help/reminders to set the goal	Chooses the goal independently
--------------------------------------	--------------------------------------	--------------------------------
4. The student consistently and independently completes the Brainstorm Box and selects three procedural facilitation cues:

Does not complete Brainstorm	Partially completes Brainstorm	Completes Brainstorm
------------------------------	--------------------------------	----------------------
5. The student consistently and independently completes the Main Points column:

Does not complete Main Points	Partially completes Main Points	Completes Main Points
-------------------------------	---------------------------------	-----------------------
6. The student knows how to use light bulbs and mouse hover-over/tapping on words to get help completing the MBGO:

Doesn't know how to get help	Needs help/reminders to get help	Independently gets help
------------------------------	----------------------------------	-------------------------
7. The student consistently and independently makes sure all the boxes are checked:

Does not self-monitor their work	Needs help/reminders to self-monitor their work	Independently self-monitors their work
----------------------------------	---	--
8. The student consistently and independently chooses the transition words for the pull-down menu:

Does not choose the transition words	Needs help/reminders when choosing	Chooses appropriate transition words
--------------------------------------	------------------------------------	--------------------------------------
9. The student knows how to cut and paste the text by selecting the button on the bottom

Does not know how to cut/paste	Needs help/reminders to copy/paste	Knows how to cut/paste
--------------------------------	------------------------------------	------------------------
10. The student consistently and independently edits the essay/listens to essay read-aloud during editing

Does not know how to edit/read aloud	Needs help/reminders to edit/read aloud	Knows how to edit/read aloud
--------------------------------------	---	------------------------------
11. The student consistently and independently completes all items on the self-evaluation section:

Does not complete the self-evaluation	Completes it partially or needs help/reminders to complete	Completes self-evaluation
---------------------------------------	--	---------------------------
12. The students consistently and independently receives feedback from the researcher:

Does not know how to provide feedback	Needs help/reminders to provide feedback	Provides appropriate feedback
---------------------------------------	--	-------------------------------

Appendix G

Guideline for Essay Elements

Functional Element	Definition	Example	Non-Example
Opinion (O)	Author's point of view on the topic - Complete thought (e.g., reader able to surmise the topic without reading the prompt) - For the topic - Against the topic - Combination of both for and against the topic - Neither for nor against the topic (explicitly stated)	- Students should wear uniform to school - I think students should wear uniforms - Students should not wear uniforms to school - Elementary school students should wear uniforms but not high school students - I don't think students should wear uniforms, but I don't think they shouldn't either.	- I agree - No, I don't think so - Yes
Reason (R)	A support, explanation, or refute of the author's premise, i.e., point of view on the topic.	- Students should wear uniforms (O) because it looks nice (R). - I don't think students should wear uniforms (O) even though it would be cheaper (R) - Students should wear uniforms (O) because it's cheaper (R) and it looks nice (R) - Students should not wear uniforms (O) because I don't like it (R)	- Students should wear uniforms (O) because I don't think they should (O) - I don't think students should wear uniforms (O) because teachers give too much homework
Elaboration (E) Based on De La Paz (1999) and Graham (1990)	Conditions, modifiers, and/or examples of a premise or reasons. - Extension on a specific idea - Conditions for a reason or premise - Purposeful repetition for emphasis or rhetorical effect - Examples	- Uniforms may be cheaper (R), that's why I like them (E). - I imagine the students fighting back for making them wear uniforms (E). - If there was a vote at school on whether to have school uniforms (E), I would disagree on having uniforms at school (O). - Schools should not have students wear uniforms (O). I will say it	- Uniforms may be cheaper (R), <u>that's</u> why I like them (E). That is why I like them (verbatim repetition). - I don't think students should wear uniforms (O). I don't like uniforms (R) because one time I got hurt and had to go to the hospital (irrelevance).
		again- students should not wear uniforms in school (E). Students lose individuality (R). For <u>example</u> everyone looks the same (E).	
Conclusion (C)	Closing statement of the topic	- This is the reason why I think students should not wear uniforms to school (C). The end (E). - Students will feel depressed not seeing colorful clothing around them (R). Schools should not force uniforms (C).	The end.
Non-Functional Element	Definition	Example	Non-Example
Repetition (RP)	Verbatim, i.e., Exact or near exact wording, of information not for rhetorical purposes	I think students should wear uniform to school (O) because is cheaper (R). Uniforms are cheaper.	I think students should wear uniform to school (O) because is cheaper (R). Uniforms are much cheaper to buy (E – rhetorical purpose).
Irrelevance (I)	Any information that does not directly relate to the topic, a premise, reasons and/or elaborations.	I don't think students should wear uniform to school (O). This morning I was late for school because my mom didn't prepare my breakfast.	I think students should wear uniform to school (O). This morning I was late for school (E) because I couldn't decide what to wear (E).
Unintelligible	Information that is not readable due to extreme spelling, syntax, and/or grammar errors.	I dnt noe to pae scoll day?	

Note: Essay elements do not need to be discrete, part of a sentence, nor stand-alone.

Appendix I

Guideline for Coherence Evaluation

Coherence Evaluation

(Scardamalia, Bereiter & Goelman, 1982)

Purpose: To determine the longest coherent string in an essay. Coherent string is a series of related functional essay elements in logical, coherent sequence (described below).

Sequence	Description	Example
1	Premise followed by either a reason or an elaboration of the premise, followed by more reasons or elaboration of the previous statement.	Premise* -> elaboration -> reason 1 -> elaboration of reason 1 -> reason 2
2	Premise followed by parallel statements of reasons and elaborations	Premise* -> reason 1 -> reason 2 -> elaboration of reason 1 -> elaboration of reason 2

*Unlike the guide for determining functional essay elements, premise for coherence does not need to stand-alone, e.g. "Yes," to be considered a part of the coherent string (Graham & Harris, 1989).

Scoring

Score	Example	Explanation
<i>Prompt: Write an essay on whether students should or should not wear uniforms to school.</i>		
-1	Schools start too early in the morning.	No relevance to the prompt.
0	I think we should because school is boring.	Only premise – a single essay element. The reason, "school is boring" does not logically relate to the premise, "I think we should."
+1	I think we should because school is boring. Besides uniforms can save money if your family is poor.	In the first sentence, "school is boring" is a non-functional essay element which causes a break in the string. The second sentence has a reason "uniforms can save money" with a next, logical elaboration, "if your family is poor."
+2	I think we should because school is boring. Besides uniforms can save money if your family is poor. I know family with five children and has a hard time buying clothes for all of them.	Continuing from +1 described above, one more relevant elaboration (in form of an example) is added to the previous elaboration.

- Scoring above will continue in this pattern to the longest sequence in the essay which may yield a score greater than +2.
- Repetition is not considered a break but not an additional part of the string.

Appendix J

Holistic Writing Quality Rubric

Criteria
10. Persuasive essay includes: - Topic sentence (discrete), - more than three reasons (discrete) - at least three examples/ elaborations (discrete), and - An ending sentence (discrete). Essay is written in a logical sequence that strengthens the writer's argument. Writer uses more than one counter argument/point in the essay.
9. Persuasive essay includes: - topic sentence (discrete), - more than three reasons (discrete), - at least 3 examples/ elaborations (discrete), and - an ending sentence (discrete). Essay is written in a logical sequence that strengthens the writer's argument. Writer uses 1 counter argument/point in the essay.
8. Persuasive essay includes: - topic sentence (discrete), - three discrete reasons, - at least 2 examples/ elaborations (discrete), and a - an ending sentence (discrete/summary). <u>Transition words should be included correctly.</u> (at least two) Essay is written in a logical sequence that strengthens the writer's argument.
7. Persuasive essay includes : - topic sentence (discrete), - three <u>discrete</u> reasons with at least 1 example/elaboration (discrete), and - an ending sentence (discrete/summary). <u>Transition words should be included.</u>(at least two) Essay is written in a <u>logical</u> sequence that strengthens the writer's argument.
6. Persuasive essay includes: - topic sentence (discrete), - three <u>discrete</u> reasons (individual reasons), - at least 1 example/elaboration (may be repetitive), and - an ending sentence (discrete/summary) Essay's sequence is weak, therefore limiting the writer's argument.
5. Persuasive essay includes: - topic sentence (discrete), - three reasons (may be repetitive and not discrete), - one example/elaboration, and - an ending sentence (discrete/summary). ESSAY INCLUDES ALL PARTS

4. Persuasive essay includes four of the following parts: - topic sentence (discrete), - one to three reasons (count each one as 1 in part count), - one to three examples/elaboration, and/or - an ending sentence (discrete/summary).
3. Persuasive essay includes three of the following parts: CAN NOT JUST BE REASONS – 3 REASONS DON'T QUALIFY: - topic sentence (discrete), - reasons (maximum of two can count), - example/elaboration (<i>maximum of two can count</i>), and/or - an ending sentence (discrete/summary).
2. Persuasive essay includes two of the following parts written; - topic sentence (discrete), - reasons, - example/elaboration, and/or - an ending sentence (discrete/summary).
1. Persuasive essay includes one of the following parts written; - topic sentence (discrete), - reason (because), and/or - an ending sentence (discrete/summary).
0. No essay parts written in complete sentences.

*Discrete is operationalized on next page. *Reasons are operationalized on next page

- When completing the Writing Quality:

Discrete means a *part* that 'stands alone' by itself.

- Student may write a discrete sentence with the topic part and no other part. Great!
But sometimes, students squish parts together in one sentence. So...
- Or** you can *make* a part discrete if needed to 'climb a scale' (since topic and ending are noted to often be 'discrete' to count). If you force a sentence that has a topic part and a reason part, prioritize that sentence as topic that is now discrete. This means the 'reason' part in that sentence no longer exists towards determining the writing quality score.

Prioritize the making of 'discrete' in this order: Topic Sentence, Ending, Reason, Reason, Reason, Elaboration(s).

Also, a **topic sentence part** can be present in a grouping of sentences. For example, the student replies to a prompt in a unique way – with a "hook" for the reader. Below, there is a **topic sentence part** below. And the topic sentence part is discrete.

Kids have to go to school for five days and they only have two days for a break each week. Do you think that it would be a good idea to take one of the free days away? Well I don't.

Reasons should clearly support the topic sentence. One strategy is to list in a numbered format the reasons identified. Do so, by reading the prompt and determining what reasons are given to explicitly serve as an answer to that prompt/question. Often, refer back to the prompt/question asked.

Appendix K

Pre- and Post-Intervention Protocols

Semi-Structured Student Pre-Instruction Interview

Note: Be sure to begin the recording. State the date and the participant. Ex. “This is Ms. Anya and I am talking with Sue. Today is August 3rd.” Make notes on this protocol as needed during the interview.

Say out loud: Today we are going to ask what you think about writing as well as what you think about writing on the computer. Please feel free to share your honest opinions with us. If you don't know an answer, just say “I don't know”. At the end, we will also ask you to do a few tasks on the computer. That is not a test; we just want to get an idea of what your computer skills and needs may be. Also, I may write down what you say or do – as we go. Any questions? Let's begin.

- 1) Tell me how you feel about writing. Is it easy or hard? Do you think you are a good writer?
- 2) Do you ever write for your own pleasure during free time?
- 3) If you are asked to write a 3-paragraph essay in school, how confident are you that you will be able to do it? On a scale from 1 to 10, 10 being most confident?
- 4) How do you approach/begin a writing assignment? Do you plan? Are you able to find ideas for writing easily?
- 5) What do you think could help you with your writing?
- 6) Do you prefer writing by hand or on the computer? Why? Which is easier?
- 7) How often do you use a computer for writing?
- 8) Do you have a computer at home? What kind? What do you use it for? Does the family share it?

(If “no” : Do you go to the library or stay after school to use their computers?)

Student Name: _____

Date: _____

Recorder #/File Name: _____

Semi-Structured Student Post-Instruction Interview

Note: Be sure to begin the recording. State the date and the participant. Ex. *"This is Ms. Anya and I am talking with Sue. Today is August 3rd."* Make notes on this protocol as needed during the interview.

Say out loud: Today we are going to ask what you think about writing as well as what you think about writing using our graphic organizer. Please feel free to share your honest opinions with us. If you don't know an answer, just say "I don't know". I may write down what you say – as we go. Any questions? Let's begin.

1. Tell us about the writing strategies that we used to help you with writing (looking for process writing strategies and planning strategies including a graphic organizer, etc.) Be sure to prompt here with "can you tell me more" to ensure you obtain what the student knows about the planning stage of writing and how/if the IDEAS, cues, and MBGO supported their writing.
2. What mnemonic/strategy/word we used to help you with writing? (IDEAS) Do you remember what IDEAS stand for? Do you remember the cues- the questions we ask ourselves to get ideas for reasons?
3. Did you like using our graphic organizer? What did you like most about it?
4. Was it important to set up the goal at the beginning? Why? Why not?
5. Was it helpful to have checkboxes in the brainstorm (give examples: "yes and no" and cue questions) Why or why not?
6. Did you use it to think of good reasons for your essay? How did you use it?
7. Do you think learning those questions (cues) in the brainstorming was helpful to you? How?
8. Did you ask yourself those question even when you were not using the graphic organizer?
9. Do you think it is helpful to have the hints under each letter of IDEAS when you hover your mouse over? Have you ever used it? How could we make it better?
10. Was it helpful to have main points and Sentences columns? Why? How did you use those? Why not?

11. What did you think about the pull down menu for transition words? Did you like it? Why? Why not? Did it help you remember those words later?
12. Was it helpful to check boxes after completing each part of the graphic organizer? Did it keep you on track? Why? Why not?
13. What did you think about the self-evaluation part? Is it important to have that part?
14. If you were a teacher, how would you change the graphic organizer to make it easier/better to use? What would you add/get rid of?
15. Have you ever used anything like our graphic organizer before we came? When? For what purposes?
16. Has using the graphic organizer, IDEAS strategy, and cues helped you become a better writer? How?
17. Do you think other students should use our graphic organizer? How do you think it could help other students?
18. If you were the teacher, what would you change about the lessons when we introduced the graphic organizer?
19. For the lessons, what things have most helped you become a better writer?
20. Tell me how much time you spent on planning and writing with and without the graphic organizer?
21. Now after learning about IDEAS and using the graphic organizer, if asked to write a persuasive essay, how confident are you that you will be able to do it? On a scale from 1 to 10, 10 being most confident?
22. Is writing with the graphic organizer easy or hard? Why?

Appendix L

Typing Test Passage

Typing Passage

In a field one summer's day a Grasshopper was hopping about, chirping and singing to its heart's content. An Ant passed by, bearing along with great toil an ear of corn he was taking to the nest. "Why not come and chat with me," said the Grasshopper, "instead of toiling and mailing in that way?" "I am helping to lay food for the winter," said the Ant, "and recommend you to do the same.

Appendix M

Baseline Protocol



Project WeGotIt!: Writing Efficiently with Graphic Organizers – Teachers Implementing Technology

Baseline Session Protocol

During baseline sessions, students will be asked to write in response to the prompt as much or as little as they wish. **Each session will last no longer than 30 minutes.**

Researcher will make sure that:

- (a) Each student has an iPad.
- (b) Writing prompts are written/typed on the board/screen, so students can see them as soon as the teacher reads the directions.
- (c) The camera is on – the red letters REC on the camera display indicate that the camera is recording.

Researcher will say the following directions to the students during baseline:

“Today I am asking you to write in response to a prompt. In a minute, I will tell you which app to open. You will need to choose ONE of the prompts to respond to. I will read the prompts out loud for you. Please do not talk to each other while writing. You can raise your hand to ask me for help only if your iPad is not working properly. Do your best with responding and spelling words since I cannot help you with this part. When you finish, let me know and I will help you SAVE AS your file on the google drive. Others may still be writing, so work quietly at your desk until they are finished. Any questions?”

Please open the Google Drive and tap your group folder then your folder. Please type in your name and B1 (or whichever baseline number it is). Look at the screen and listen carefully as I read the prompts:

Choice A: Write an essay on whether or not students your age should have a set bedtime.

Choice B: Write an essay on whether or not students should be allowed to use vending machines at school all day long.

Choose one of the prompts to respond to and when you are ready, start typing in the app. You may begin.”

NOTE: Do not provide any help besides technical assistance during writing. Tell students again “just to do your best” if they request support with ideas, spelling, grammar, etc. Provide help only if the technology is malfunctioning or when a student raises his/her hand to save their document.

Appendix N

Lesson 1 Plan

LEARN Model Lesson 1 Plan

Lesson 1 Objective: Students will be able to understand and recall the different components of a persuasive paragraph using the strategy IDEAS to become better writers.

Materials Needed: PowerPoint presentation, student agenda, parts of essay label/practice sheet, Ideas label sheet, sample graphic organizer color coded for labeling, and exit ticket

Component	Time Allotment	Description
Link	5 minutes	Start with reviewing purpose and the lesson agenda Activate student background knowledge of persuasion - Look at an ad from a magazine - Discuss: What is the ad trying to convince to do? (opinion) Why do think you should buy this? (reason) What's the example they give you as to when you need it? (example)
Engage and Educate Active Learning Reflect	30 minutes	(E) Focused Lesson: - Relationship between opinion, reasons and examples in a persuasive essay - Give example with a sample prompt (A) Student try to come up with their own a different prompt (R) Share their own examples with other student(s) and/or instructor E) Focused Lesson: - How do remember the different parts? IDEAS - We know IDE – but hat is AS? A (words to connect parts) and S (to end essay – I and S are like buns of a burger) - Show how IDEAS look like in the TBGO - Example with a prompt (A) Student try to come up with their own a different prompt (R) Share their own examples with other student(s) and/or instructor
Now and Then	5 minutes	Exit ticket: Examples of opinions, reasons and examples, that the students must idea. Identify different what IDEAS stand for with word bank

Lesson 1 PowerPoint Presentation



Lesson 1

Objective: Students will be able to understand and recall the different components of a persuasive paragraph using the strategy IDEAS to become better writers.



Agenda

Complete?	Task
✓	Introductions and Agenda
✓	Expectations and Key Words
✓	Persuasion and Writing
✓	Strategy: IDEAS
✓	Identify the Part!
✓	Label a Persuasive Essay
	Lesson Wrap-Up

Expectations

- Expectation 1
- Expectation 2
- Expectation 3
- Expectation 4
- Expectation 5

Key Words

- Opinion
- Reason
- Example



You're doing a great job!!!






What's the Relationship between opinion, reasons, and examples?



Example: Should schools offer after school activities?

I think schools should offer after school activities.

Students can stay after school and make up work with a teacher.

If I am absent from school, I can make up work and not fall behind.

7

You try with a partner: Should students make up snow days?

Opinion

Reason

Example

2 minutes

8

Good Job Break!

9

But how do you remember all the different parts?

I have IDEAS!

10

Identify your opinion

Determine 3 reasons

Elaborate with examples

Add transition words as you go

Summarize

11

How do we use this in our graphic organizer?

12

You're doing a great job!!!

13

28. In the chart below, click here to see an example.

Breakfast: Click here to see an example.

	Main Points	Sentences	Check your work
Opinion	Identify your opinion	Click here to see an example	☐ I included my opinion
Reason 1	Determine 1 reason	Click here to see an example	☐ I included 1 reason to support my topic
Example 1	Elaborate with examples	Click here to see an example	☐ I have at least 3 examples to support my opinion
Reason 2	Determine 2nd reason	Click here to see an example	☐ I have at least 2 more reasons to support my topic
Example 2	Elaborate with examples	Click here to see an example	☐ I have at least 2 more examples to support my opinion
Reason 3	Determine 3rd reason	Click here to see an example	☐ I have at least 1 more reason to support my topic
Example 3	Elaborate with examples	Click here to see an example	☐ I have at least 1 more example to support my opinion
Summarize	Add transition words as you go!	Click here to see an example	☐ I have proper transition words
	Summarize	Click here to see an example	☐ I summarized my opinion

Let's try together: Should students eat and drink in class?

	Main Points	Sentences	Check your work
Opinion	Identify your opinion	Click here to see an example	☐ I included my opinion
Reason 1	Determine 1 reason	Click here to see an example	☐ I included 1 reason to support my topic
Example 1	Elaborate with examples	Click here to see an example	☐ I have at least 3 examples to support my opinion
Reason 2	Determine 2nd reason	Click here to see an example	☐ I have at least 2 more reasons to support my topic
Example 2	Elaborate with examples	Click here to see an example	☐ I have at least 2 more examples to support my opinion
Reason 3	Determine 3rd reason	Click here to see an example	☐ I have at least 1 more reason to support my topic
Example 3	Elaborate with examples	Click here to see an example	☐ I have at least 1 more example to support my opinion
Summarize	Add transition words as you go!	Click here to see an example	☐ I have proper transition words
	Summarize	Click here to see an example	☐ I summarized my opinion

30 You try: Should students have pets?

	Main Points	Sentences	Check your work
Opinion	Identify your opinion	Click here to see an example	☐ I included my opinion
Reason 1	Determine 1 reason	Click here to see an example	☐ I included 1 reason to support my topic
Example 1	Elaborate with examples	Click here to see an example	☐ I have at least 3 examples to support my opinion
Reason 2	Determine 2nd reason	Click here to see an example	☐ I have at least 2 more reasons to support my topic
Example 2	Elaborate with examples	Click here to see an example	☐ I have at least 2 more examples to support my opinion
Reason 3	Determine 3rd reason	Click here to see an example	☐ I have at least 1 more reason to support my topic
Example 3	Elaborate with examples	Click here to see an example	☐ I have at least 1 more example to support my opinion
Summarize	Add transition words as you go!	Click here to see an example	☐ I have proper transition words
	Summarize	Click here to see an example	☐ I summarized my opinion

EXIT TICKET: Do you remember all the different parts?

17

Excellent Job Today!

18

Lesson 1 Student Agenda

Name: _____

Date: _____

IDEAS Strategy + Technology Tool = Ways to Become a Better Writer

Agenda for Lesson 1:

- ☐ Introductions and Agenda
- ☐ Expectations and Key Words
- ☐ Relationships between Opinions, Reasons, and Examples
- ☐ Strategy: IDEAS
- ☐ Graphic Organizer
- ☐ Exit Ticket

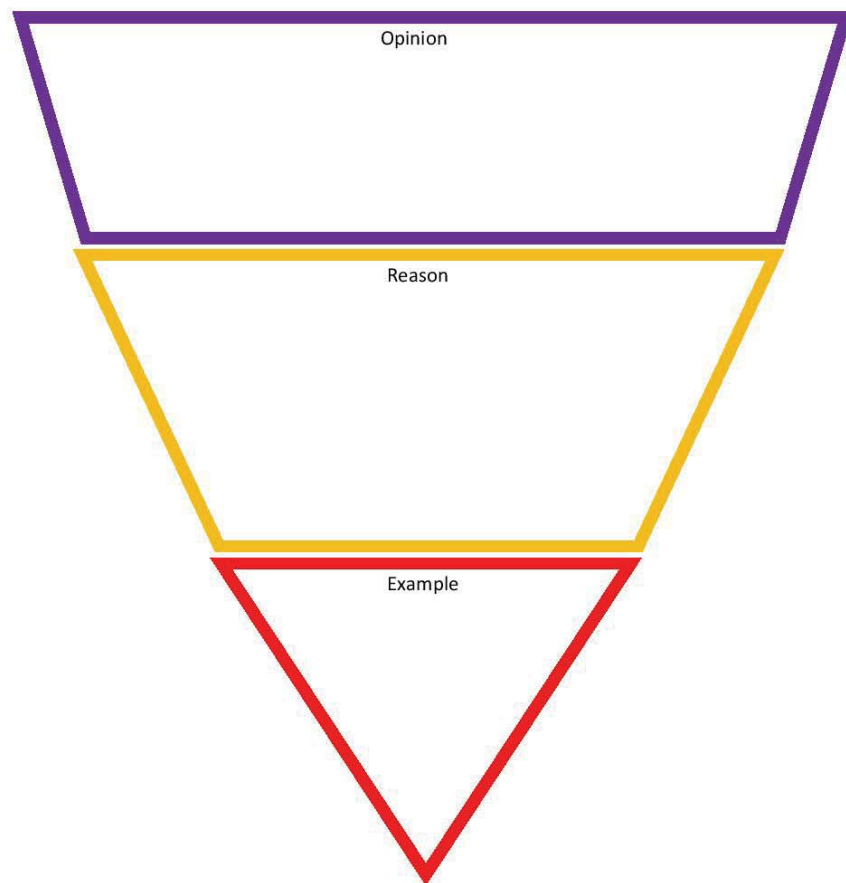
Key Terms:

- ☐ Opinion: _____
- ☐ Reasons: _____
- ☐ Examples: _____

Lesson 1 Parts of Essay Practice Worksheet

Lesson 1: Parts of Essay Practice

Prompt: Should students make up snow days?



Lesson 1 Identify IDEAS Worksheet

Name: _____

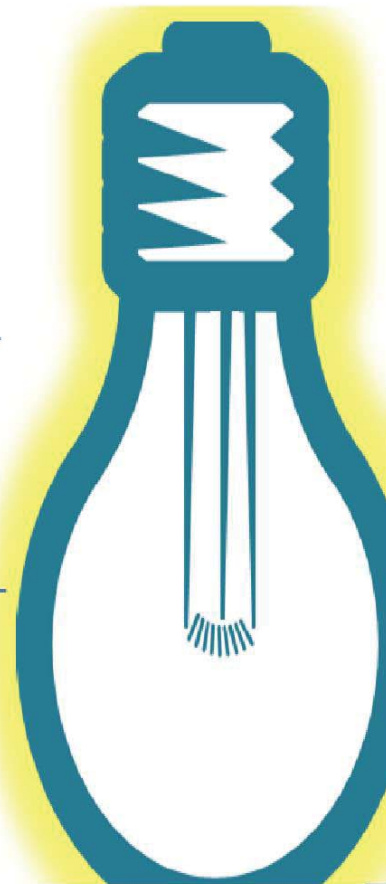
Date: _____

Lesson 1 Identify IDEAS

Directions:

Label IDEAS: **I** – Identifying your opinion; **D**- determining your reasons; **E**- elaborating with examples; **A**- adding transitions words; and **S**- Summarize. There may be more than one per sentence.

I _____
D _____
E _____
A _____
S _____



Lesson 1 MBGO Practice Worksheet

Lesson 1: TBGO Practice

PROMPT
Choice A: Should students have pets?
Choice B:

1

Pick your goal: Choose your goal here!



2

Fill in the chart below. [Click here to see an example.](#)

	Brainstorm:	Does it change your-	
	Yes ☐ No ☐	Mind ☐ Feelings ☐ Money ☐	Body ☐ Relationships ☐ Environment ☐ Time ☐
	Main Points	Sentences	Check your work!
Identify your opinion		enter text.	☐ I included my <u>opinion</u> .
Determine 1 st reason		em. Click here to enter text.	☐ I included <u>3</u> <u>reasons</u> to support my topic.
Elaborate with examples		em. Click here to enter text.	
Determine 2 nd reason		em. Click here to enter text.	
Elaborate w/ examples		em. Click here to enter text.	
Determine 3 rd reason		em. Click here to enter text.	☐ I have as many <u>examples</u> as I planned to have in my goal.
Elaborate w/ examples		em. Click here to enter text.	
Add transition words as you go!			☐ I have proper <u>transition words</u> .
Summarize		em. Click here to enter text.	☐ I <u>summarized</u> my opinion.

Lesson 1 Exit Ticket

Name: _____

Date: _____

Lesson 1 Exit Ticket

Directions:

Identify IDEAS: **I** – Identifying your opinion; **D**- determining your reasons; **E**- elaborating with examples; **A**- adding transitions words; and **S**- Summarize. There may be more than one per sentence.

Prompt: Should school lunch include dessert at every meal?

- A. For example, students can get diabetes. _____
- B. I don't think school lunch should include dessert at every meal. _____
- C. Therefore, I don't think school lunch should include dessert. _____
- D. First, eating dessert is not healthy for you. _____
- E. To illustrate, students may gain weight. _____
- F. Also, dessert has too much sugar. _____
- G. To illustrate, there are students who can't afford higher lunch prices. _____
- H. In addition, adding dessert will require more money. _____

Using the letters next to each sentence, put in order of how the paragraph should be written:

Appendix O

Lesson 2 Plan

LEARN Model Lesson 2 Plan

Lesson 2 Objective: Students will be able to generate ideas for reasons/examples using self-questioning cues to write a persuasive paragraph to become better writers.

Materials Needed: PowerPoint presentation, student agenda, Review Parts with IDEAS sheet, TBGO Practice, and exit ticket

Component	Time Allotment	Description
Link	5 minutes	Start with reviewing purpose and the lesson agenda Link by reviewing Lesson 1 - Key words - IDEAS strategy - Relationship between IDE
Engage and Educate Active Learning Reflect	30 minutes	(E) Focused Lesson: how do we generate ideas for reasons? Examples are easy if we have a good reason. Teachers will give an example of reason for a prompt about after school activities – Opportunities to learn more – “What is an example or explanation of that?” We can think of reasons by: - Cues to ask yourself: Does it change your mind, feelings, money, body, relationships, environment, and/or time? - Give example with a sample prompt and how to go through by asking yourself the cues to generate ideas. They do not have to have all, but need to have at least three. (A) Student try to come up with their own a different prompts (R) Share their own examples with other student(s) and/or instructor E) Focused Lesson: - We try the same cues with the TBGO. - Try with a prompt together - Can we think of examples for the reasons? (A) Student try to come up with their own a different prompt (R) Share their own examples with other student(s) and/or instructor
Now and Then	5 minutes	Exit ticket: Fill in the blank to recall cues, and identify the different parts of the TBGO

Lesson 2 PowerPoint Presentation



Lesson 2

Objective: Students will be able to generate ideas for reasons/examples using self-questioning cues to write a persuasive paragraph to become better writers.



Agenda

Complete?	Task
✓	Introductions and Agenda
✓	Expectations and Key Words
✓	Review Persuasive Essay Parts and IDEAS
✓	Generating Reasons Using Cues
✓	Practice Using TBGO
✓	Exit Ticket

Expectations

- Expectation 1
- Expectation 2
- Expectation 3
- Expectation 4
- Expectation 5

Key Words

- Opinion
- Reason
- Example



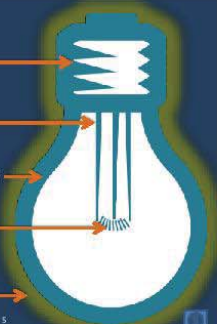
Identify your opinion

Determine 3 reasons

Elaborate with examples

Add transition words as you go

Summarize



Example: Should schools offer after school activities?

I think schools should offer after school activities.

Students can stay after school and make up work with a teacher.

If I am absent from school, I can make up work and not fall behind.

Therefore, schools should offer after school activities.

Let's try together: Should students eat and drink in class?

Reasons	Main Points	Sentences	Check your word
Opinion	Should not	It is not a good idea.	no other my opinion
Example	Drop food, floors sticky	When we eat, it is very messy and it is not good for the floor.	no other 2 reasons to support my topic.
Example	Spills drink on the computer and damage	When we drink, it is very messy and it is not good for the computer.	I have an idea to solve the problem.
Example	Focus on eating not teacher	When we eat, it is not good for the teacher.	I have proper reasons on words.
Summarize	Should not	It is not a good idea.	I summarized my topic on.

But.....

How will it change?

How Does It Change:

YOUR MIND?

YOUR FEELINGS?

YOUR MONEY?

YOUR BODY?

YOUR RELATIONSHIPS?

YOUR ENVIROMENT?

YOUR TIME

Let's Practice: Should schools offer after school activities?

YOUR MIND? Learn more. Ex: Teacher helps you learn what you didn't understand in class.

YOUR FEELINGS? ????

YOUR MONEY? Save money. Ex: Mom and Dad don't have to spend money on babysitters.

YOUR BODY? Can join sport team and get healthy. Ex: If I was home I would watch TV and not exercise.

YOUR RELATIONSHIPS? Hang out with friends. Ex: I can spend time with friends who live far away from me.

YOUR ENVIROMENT? ????

YOUR TIME Good use of time Ex: If I was home, I would waste my time playing video games.

Let's Practice: Should students make up snow days?

YOUR MIND?

YOUR FEELINGS?

YOUR MONEY?

YOUR BODY?

YOUR RELATIONSHIPS?

YOUR ENVIROMENT?

YOUR TIME

30

Let's Practice: Should students be allowed to eat and drink in class?

YOUR MIND?

YOUR FEELINGS?

YOUR MONEY?

YOUR BODY?

YOUR RELATIONSHIPS?

YOUR ENVIROMENT?

YOUR TIME

30

You try: Should students have pets?

	Main Points	Sentences	Check your work!
Identify your opinion	YES - I think so.	Students should have pets.	☐ I included my opinion.
Determine 1st reason	Expensive	Students who have pets can learn responsibility.	☐ I included 1 reason to support my topic.
Elaborate with examples		Students who have pets can learn responsibility.	☐ I have an empty sentence to provide a final thought.
Determine 2nd reason	Make mess	Students who have pets can learn responsibility.	☐ I have an empty sentence to provide a final thought.
Elaborate with examples		Students who have pets can learn responsibility.	☐ I have an empty sentence to provide a final thought.
Solve time to care for it		Students who have pets can learn responsibility.	☐ I have an empty sentence to provide a final thought.
Add focus topic words as you go!		Students who have pets can learn responsibility.	☐ I have an empty sentence to provide a final thought.
Summarize	YES - I think so.	Students who have pets can learn responsibility.	☐ I have an empty sentence to provide a final thought.

Good Job Break!!

How Does It Change:

YOUR

YOUR

YOUR

YOUR

YOUR

YOUR

Let's write an essay by yourself!

You can DO IT!!!

One last look! 😊

YOUR MIND?

YOUR FEELINGS?

YOUR MONEY?

YOUR BODY?

YOUR RELATIONSHIPS?

YOUR ENVIROMENT?

YOUR TIME

10

Names: _____ Date: _____

Check A: Should students have pets? ☐

Check B: Should students who have pets be allowed to have them? ☐

1 Pick your goal! Choose your goal here!

2 Fill in the chart below. Click here to see an example.

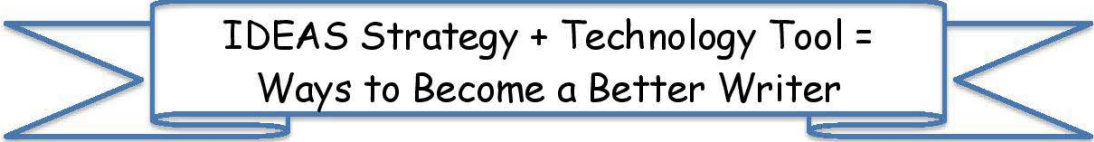
	Main Points	Sentences	Check your work!
Identify your opinion	YES - I think so.	Students should have pets.	☐ I included my opinion.
Determine 1st reason	Expensive	Students who have pets can learn responsibility.	☐ I included 1 reason to support my topic.
Elaborate with examples		Students who have pets can learn responsibility.	☐ I have an empty sentence to provide a final thought.
Determine 2nd reason	Make mess	Students who have pets can learn responsibility.	☐ I have an empty sentence to provide a final thought.
Elaborate with examples		Students who have pets can learn responsibility.	☐ I have an empty sentence to provide a final thought.
Solve time to care for it		Students who have pets can learn responsibility.	☐ I have an empty sentence to provide a final thought.
Add focus topic words as you go!		Students who have pets can learn responsibility.	☐ I have an empty sentence to provide a final thought.
Summarize	YES - I think so.	Students who have pets can learn responsibility.	☐ I have an empty sentence to provide a final thought.



Lesson 2 Student Agenda

Name: _____

Date: _____



IDEAS Strategy + Technology Tool = Ways to Become a Better Writer

Agenda for Lesson 2:

- ☐ Introductions and Agenda
- ☐ Expectations and Key Words
- ☐ Review Persuasive Essay Parts and IDEAS
- ☐ Generating Reasons Using Cues
- ☐ Practice Using TBGO
- ☐ Exit Ticket

Key Terms:

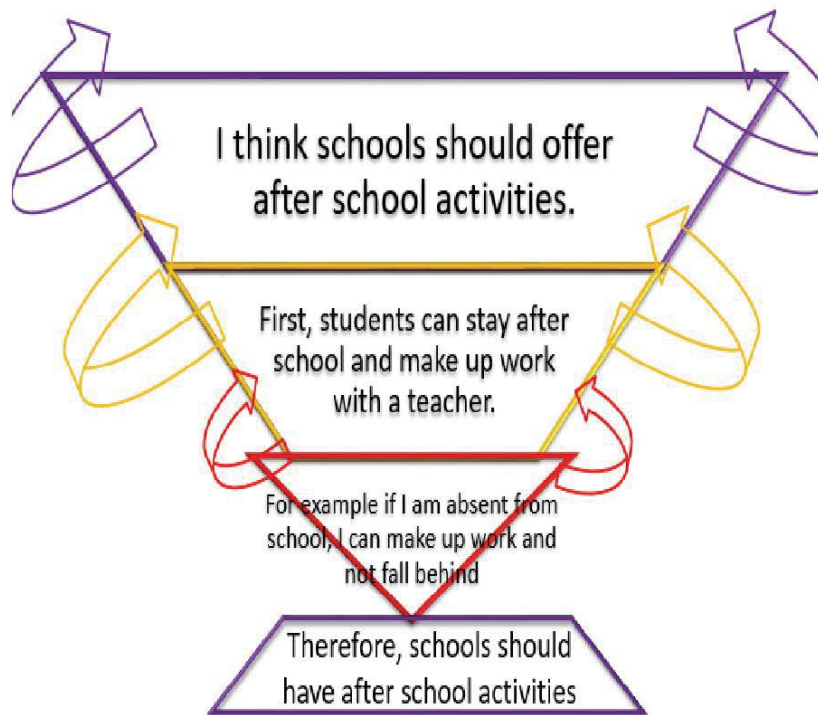
- ☐ Opinion: _____
- ☐ Reasons: _____
- ☐ Examples: _____

Lesson 2 Parts of Essay Practice Worksheet

Lesson 2: Parts of Essay Practice

Label IDEAS - **I** – Identifying your opinion; **D**- determining your reasons; **E**- elaborating with examples; **A**- adding transitions words; and **S**- Summarize. There may be more than one per sentence.

Example: Should schools offer after school activities?



Lesson 2 MBGO Practice Worksheet

Lesson 2: TBGO Practice

PROMPT

Choice A: Should students have year-round school?

Choice B: Should students take turns coming in on Saturdays to clean their school?

1

Pick your goal: Choose your goal here!



2

Fill in the chart below. [Click here to see an example.](#)

Brainstorm: Mind ☐ Does it change your- Body ☐ Time ☐ Yes ☐ No ☐ Feelings ☐ Relationships ☐ Money ☐ Environment ☐			
	Main Points	Sentences	Check your work!
Identify your opinion		enter text.	☐ I included my <u>opinion</u> .
Determine 1st reason		em. Click here to enter text.	☐ I included <u>3</u> <u>reasons</u> to support my topic. ☐ I have as many <u>examples</u> as I planned to have in my goal.
Elaborate with examples		em. Click here to enter text.	
Determine 2nd reason		em. Click here to enter text.	
Elaborate w/ examples		em. Click here to enter text.	
Determine 3rd reason		em. Click here to enter text.	
Elaborate w/ examples		em. Click here to enter text.	☐ I have proper <u>transition words</u> . ☐ I <u>summarized</u> my opinion.
Add transition words as you go!			
Summarize		em. Click here to enter text.	

Lesson 2 Exit Ticket

Name: _____

Date: _____

Lesson 2 Exit Ticket

Directions:

Write the cues that we learned to help us think of ideas

Does It Change:

YOUR []

YOUR []

YOUR []

YOUR []

YOUR []

YOUR []

YOUR []

Do you remember what IDEAS stand for? Put it in the right order

Determine 3 reasons

Identify your opinion

Elaborate with examples

Add transition words as you go

Summarize

Appendix P

Lesson 3 Plan

LEARN Model Lesson 3 Plan

Lesson 3 Objective: Students will be able to cooperatively observe and follow the process of using all sections of the technology-based graphic organizer.

Materials Needed: PowerPoint presentation, iPads, student agenda, warm-up, prompts on paper, and exit ticket

Component	Time Allotment	Description
Link	10 minutes	Start with reviewing purpose and the lesson agenda Key words: Brainstorm, Transition Words - Scavenger hunt warmup with iPad
Engage and Educate Active Learning Reflect	30 minutes	(E) Focused Lesson: Teacher models the process of completing the full graphic organizer by soliciting students' ideas and thoughts. The prompts will be presented on a piece of paper. - Choice A: Should students have to make up snow days? - Choice B: Should taking P.E. classes be a choice in middle school? - Introduce the live modeling activity. - Select the prompt - Talk aloud the process of completing the Brainstorm box based on the goal - Talk aloud the process of organizing the ideas from the Brainstorm box into the Main Points column. - Guide students through developing a sentence based on the word or phrase in the brainstorm column. - Emphasize complete sentences with periods and capital letters. - Students will need to make sure that ALL the boxes are checked before moving on. If they try to move on without having ALL the boxes checked – a pop-up window will appear telling you that 'Your goal is not met! Please go back and make changes'. Emphasize that they need to go back and make those changes. - The text will be pasted automatically when pressing Copy button. - Think aloud the 'evaluate' section of the graphic organizer - Instruct students to get in pairs. Students will provide feedback to their peers on what they wrote in their paragraph that helped them to become a better writer. (A) Student will be following along of all the steps above on his or her own iPad. (R) Students share with other student(s) and/or instructor to receive final feedback
Now and Then	5 minutes	Exit ticket: What's Missing worksheet

Lesson 3 PowerPoint Presentation



Lesson 3

Objective: Students will be able to cooperatively observe and follow the process of using all sections of the technology-based graphic organizer.

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Agenda

Complete?	Task
	Expectations and Key Words
	Warm-up
	Live Modeling: Technology-Based Graphic Organizer
	Lesson Wrap Up – What's Missing?

Expectations

- 1.
- 2.
- 3.
- 4.
- 5.

Key Words

- Brainstorm
- Transition Words





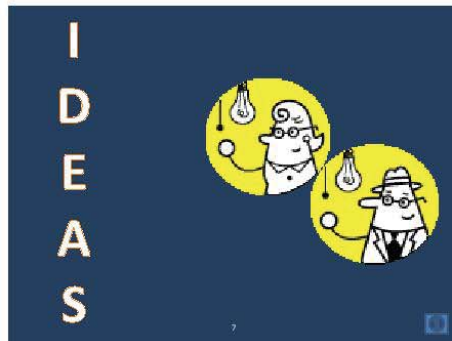

Agenda

Complete?	Task
✓	Expectations and Key Words
	Warm-up
	Live Modeling: Technology-Based Graphic Organizer
	Lesson Wrap Up – What's Missing?

Warm Up: Scavenger Hunt







Complete?	Task
✓	Expectations and Key Words
✓	Warm-up
	Live Modeling: Technology-Based Graphic Organizer
	Lesson Wrap Up – What's Missing?

Planning and Writing
in the
Graphic Organizer:

LIVE MODELING

Complete?	Task
✓	Expectations and Key Words
✓	Warm-up
✓	Live Modeling: Technology-Based Graphic Organizer
	Lesson Wrap Up – What's Missing?

Lesson Wrap Up: What's Missing?

Complete?	Task
✓	Expectations and Key Words
✓	Warm-up
✓	Live Modeling: Technology-Based Graphic Organizer
✓	Lesson Wrap Up – What's Missing?

End of Lesson 3



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Lesson 3 Student Agenda

Name: _____

Date: _____

IDEAS Strategy + Technology Tool = Ways to Become a Better Writer

Agenda:

- ☐ Expectations and Key Words
- ☐ Warm-up
- ☐ LIVE Modeling: Technology-Based Graphic Organizer
- ☐ Lesson Wrap-up: What's Missing?

Key Terms:

- ☐ Brainstorm: _____
- ☐ Transition words: _____

Lesson 3 Warm Up

Graphic Organizer Warm up: Scavenger Hunt		Name: _____			
		Date: _____			
Directions: Put your name and date at the top of the paper. Please use the computer based graphic organizer to complete the following items. Write your answers on this handout. You may work with a partner.					
1. Identify your opinion Look at the graphic organizer. Look for text in the column that says, IDEAS. To find the secret hint, place your cursor over text (in the computer version) or touch text (in the app). Write the secret hints for parts below: Identify your opinion: _____ Determine 1st reason: _____ Add transition words as you go: _____	2. How many <u>reasons</u> should you include in your computer-based graphic organizer? A. Two B. Six C. Three D. Seven				
3. In the strategy, IDEAS, each letter stands for a phrase to remind you to add all of your paragraph parts. This letter reminds you to elaborate on your reasons: ____ This letter reminds you to restate your opinion at the end of the essay: ____					
4. The graphic organizer has transition words in drop-down menus: Choose an item. What is <u>one</u> good transition word to select when summarizing your essay? _____					
5. Look at this section of the graphic organizer. Circle the section that you think prompts you to turn your brainstorm ideas into complete sentences. <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td style="width: 33%; text-align: center; padding: 10px;"> Main Points </td> <td style="width: 33%; text-align: center; padding: 10px;"> Sentences </td> <td style="width: 33%; text-align: center; padding: 10px;"> Check your work! </td> </tr> </table>			Main Points	Sentences	Check your work!
Main Points	Sentences	Check your work!			

Lesson 3 Prompts

Lesson 3 Prompts

Choose one of the following:

Choice A: Should students have to make up snow days?

Choice B: Should taking P.E. classes be a choice in middle school?

Lesson 3 Exit Ticket

Name: _____

Date: _____

Directions: A good writer started filling out this graphic organizer to write a persuasive essay but forgot to fill in some parts. Look at this graphic organizer and find the missing parts. Answer the questions below.

2 Fill in the chart below. [Click here to see an example.](#)

	Main Points	Sentences	Check your work!
Brainstorm: Click here to enter text.			
Identify your opinion	best pets	Cats are the best pets to own.	☒ I included my opinion .
Determine 1st reason	Click here to enter text.	To begin, they are very easy to take care of.	☒ I included 3 reasons to support my topic.
Elaborate with examples	walks	For example, you don't have to take them out for walks.	☐ I have as many examples as I planned to have in my goal.
Determine 2nd reason	Click here to enter text.	Second, they do not require a lot of attention.	
Elaborate w/ example	toys	For example, you can give them toys and they can play by themselves.	
Determine 3rd reason	cheap	Likewise, cats are really cheap to buy.	
Elaborate w/ example	Click here to enter text.	To illustrate, they don't cost a lot of money.	☐ I have proper transition words .
Add transition words as you go!			☐ I summarized my opinion.
Summarize	Click here to enter text.	In conclusion, cats are a great pet to buy, because they are easy to take care of and do not need a lot of attention.	

1. Circle the parts our writer forgot to complete?

Brainstorm

Main Points

Sentences

Check your work

2. Why did our writer need to complete all the parts?

Appendix Q

Lesson 4 Plan

LEARN Model Lesson 4 Plan

Lesson 4 Objective: Students will be able to use the technology-based graphic organizer independently.

Materials Needed: PowerPoint presentation, iPads, student agenda, warm-up, prompts written on paper, and exit ticket

Component	Time Allotment	Description
Link	10 minutes	Start with reviewing purpose and the lesson agenda Key words: Persuade Evaluate - Warm Up - Review IDEAS - Briefly reviews the parts of the TBGO
Engage and Educate Active Learning Reflect	30 minutes	(E) Focused Lesson: Provide Students with a Prompt (s) to respond to using the CBGO independently. Supports are given to student if needed. - Prompt A. Should your middle school keep the bathroom doors locked? Give reasons and examples to support your position. - Prompt B. Should students in your school have assigned seats in the cafeteria? (A) Student will be working independently of all the steps above on his or her own iPad. (R) Students share with other student(s) and/or instructor to receive final feedback
Now and Then	5 minutes	Exit ticket: Mastery Checklist

Lesson 4 PowerPoint Presentation



Lesson 4

Objective: Students will be able to use the technology-based graphic organizer independently.

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Agenda

Complete?	Task
	Expectations and Key Words
	Warm-up: Write down the strategy!
	Review Features of Technology-Based Graphic Organizer
	Writing Prompt- Your Turn!

Expectations

- 1.
- 2.
- 3.
- 4.
- 5.

Key Word - Review

- Persuade
- Evaluate



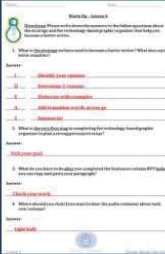


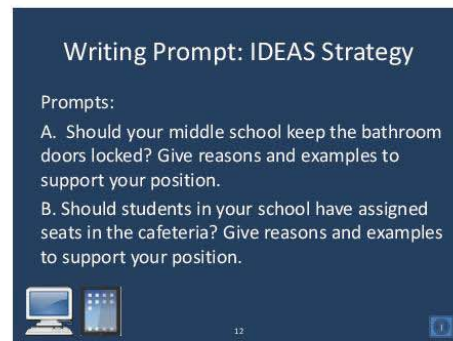
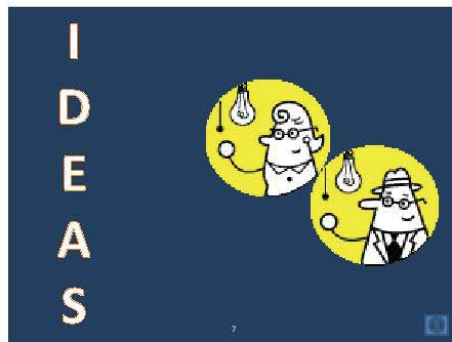

Agenda

Complete?	Task
✓	Expectations and Key Words
	Warm-up: Write down the strategy!
	Review Features of Technology-Based Graphic Organizer
	Writing Prompt- Your Turn!

Warm Up









Agenda

Complete?	Task
	Expectations and Key Terms
	Warm-up: Write down the strategy!
	Review Features of CBGO
	Writing Prompt- Your Turn!


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End of Lesson 4



Writing Fluently with Graphic Organizers - Teachers Integrating Technology



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Lesson 4 Student Agenda

Name: _____

Date: _____

IDEAS Strategy + Technology Tool = Ways to Become a Better Writer

Agenda:

- ☐ Expectations and Key Words
- ☐ Warm-up: Write Down the Strategy!
- ☐ Review Features of Technology-Based Graphic Organizer
- ☐ Writing Prompt: Your Turn!

Key Terms:

- ☐ Persuade: _____
- ☐ Evaluate: _____

Lesson 4 Warm Up

Name: _____

Date: _____

Warm Up – Lesson 4



Directions: Please write down the answers to the follow questions about the strategy and the technology-based graphic organizer that help you become a better writer.

1. What is the strategy we have used to become a better writer? What does each letter stand for?

Answer:

2. True or False: You should complete EVERY part of the TBGO? _____

3. Write the 7 questions you should ask yourself when thinking of reasons for your opinions.

HOW DOES IT CHANGE YOUR.....

Lesson 4 Prompts

Lesson 4 Prompts

Choose one of the following:

Choice A: Should your middle school keep the bathroom doors locked? Give reasons and examples to support your position.

Choice B: Should students in your school have assigned seats in the cafeteria? Give reasons and examples to support your position.

Appendix R

Treatment Protocol



Project WeGotIt!: Writing Efficiently with Graphic Organizers – Teachers Implementing Technology

Treatment Session Protocol

During treatment sessions, students will be asked to write in response to the prompt as much or as little as they wish. **Each session will last no longer than 30 minutes.**

Researcher will make sure that:

- (a) Each student has an iPad.
- (b) Writing prompts are written/typed on the board/screen, so students can see them as soon as the teacher reads the directions.
- (c) The camera is on – the red letters REC on the camera display indicate that the camera is recording.

Researcher will say the following directions to the students during treatment:

“Today I am asking you to write in response to a prompt. In a minute, I will tell you which app to open. You will need to choose ONE of the prompts to respond to. I will read the prompts out loud for you. Please do not talk to each other while writing. You can raise your hand to ask me for help only if your iPad is not working properly. Do your best with responding and spelling words since I cannot help you with this part. When you finish, let me know and I will help you SAVE AS your file on the google drive. Others may still be writing, so work quietly at your desk until they are finished. Any questions?”

Please open the Project WeGotIt app and tap on the Soo’s GO button. Please type in your name and T1 (or whichever treatment number it is). Look at the screen and listen carefully as I read the prompts:

Choice A: Write an essay on whether or not students your age should have a set bedtime.

Choice B: Write an essay on whether or not students should be allowed to use vending machines at school all day long.

Choose one of the prompts to respond to and when you are ready, start typing in the app. You may begin.”

NOTE: Do not provide any help besides technical assistance during writing. Tell students again “**just to do your best**” if they request support with ideas, spelling, grammar, etc. Provide help only if the technology is malfunctioning or when a student raises his/her hand to save their document.

Appendix S

Lesson 5 Maintenance Plan

LEARN Model Lesson 5 Plan

Lesson 5 Objective: Students will be able to plan and use a strategy to independently write a persuasive essay without the supports of the TBGO.

Materials Needed: iPads, student agenda/warm-up, and prompts on paper

Component	Time Allotment	Description
Link	5 minutes	Start with lesson agenda Warm up: Strategy and Cue question recall
Engage and Educate Active Learning Reflect	30 minutes	(E) Focused Lesson: Just the prompts are there – not the TBGO. Students can follow along without materials and/or write down (on the back of their warm-up) what teacher models on screen. Choose the prompt not used for Lesson 4 - Ask: What if you didn't have the computer based graphic organizer? - Choice A: Write an essay on whether or not you should go to school on Saturdays. - Choice B: Write an essay on whether or not schools should be separate for girls and boys Instructor writes the following on a blank word document on iPad. I D (3) E (1) A S Instructor will "think-out-loud" each section - Identify opinion by writing yes or no - Brainstorm for determining three reason by thinking about the cues – How does.... - Come up with examples - Check to make sure transition words were written - Summarize by restating the opinion with a summary transition word - Write complete sentences (remind to write capital letters and ends with punctuation) - Self-evaluation – "how did I do?" Instructor asks the students: Are you ready to try 'the challenge' out on your own? (A) Student will do all the steps above on his or her own iPad independently with supports if needed. (R) Students share with other student(s) and/or instructor to receive final feedback
Now and Then	2 minutes	Exit ticket: Verbally self-assess their work. What was great about their essay?

Lesson 5 Student Agenda

Name: _____

Date: _____

IDEAS Strategy + Technology Tool = Ways to Become a Better Writer

Agenda:

- ☐ Warm-up: Recall the Strategy
- ☐ A New Challenge
- ☐ No GO!!?? (Model)
- ☐ Ready for the challenge?

Recall the IDEAS and cue questions here.

Lesson 5 Prompts

Lesson 5 Prompts

Choose one of the following:

Choice A: Write an essay on whether or not you should go to school on Saturdays.

Choice B: Write an essay on whether or not schools should be separate for girls and boys

Appendix T

Maintenance Protocol



Project WeGotIt!: Writing Efficiently with Graphic Organizers – Teachers Implementing Technology

Maintenance Session Protocol

During maintenance sessions, students will be asked to write in response to the prompt as much or as little as they wish. **Each session will last no longer than 30 minutes.**

Researcher will make sure that:

- (a) Each student has an iPad.
- (b) Writing prompts are written/typed on the board/screen, so students can see them as soon as the teacher reads the directions.
- (c) The camera is on – the red letters REC on the camera display indicate that the camera is recording.

Researcher will say the following directions to the students during baseline:

“Today I am asking you to write in response to a prompt. In a minute, I will tell you which app to open. You will need to choose ONE of the prompts to respond to. I will read the prompts aloud for you. Please do not talk to each other while writing. You can raise your hand to ask me for help only if your iPad is not working properly. Do your best with responding and spelling words since I cannot help you with this part. When you finish, let me know and I will help you SAVE AS your file on the google drive. Others may still be writing, so work quietly at your desk until they are finished. Any questions?”

Please open the Google Drive and tap your group folder then your folder. Please type in your name and M1 (or whichever maintenance number it is). Look at the screen and listen carefully as I read the prompts:

Choice A: Write an essay on whether or not students your age should have a set bedtime.

Choice B: Write an essay on whether or not students should be allowed to use vending machines at school all day long.

Choose one of the prompts to respond to and when you are ready, start typing in the app. You may begin.”

NOTE: Do not provide any help besides technical assistance during writing. Tell students again “just to do your best” if they request support with ideas, spelling, grammar, etc. Provide help only if the technology is malfunctioning or when a student raises his/her hand to save their document.

Appendix U

Scoring Sheet for Each Essay

Scoring Sheet

Name of Student: _____

Session: _____

Functional Essay Element:

Non-Functional Essay Element:

Coherence:

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Total: _____

Quality: _____

Words: _____

Sentences: _____

Transition Words: _____

Notes:

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Biography

Soo Y. Ahn received her Bachelor of Arts in International Relations and Religion from the College of William and Mary in 2003. She holds a master's degree in International Cooperation from Yonsei University, and a master's degree in Special Education from George Mason University. She was employed as a special education teacher for students with emotional and behavior disorders in Fairfax County prior to entering the Ph.D. program at George Mason University.