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## Effects of Planning and Repeated Writing Interventions on Writing Fluency

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# **EFFECTS OF PLANNING AND REPEATED WRITING INTERVENTIONS ON WRITING FLUENCY**

A Dissertation

Submitted to the Graduate Faculty of the  
Louisiana State University and  
Agricultural and Mechanical College  
in partial fulfillment of the  
requirements for the degree of  
Doctor of Philosophy

in

The Department of Psychology

by

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## **ABSTRACT**

Writing is an essential skill for academic success. Evidence shows students with writing difficulties experience lower overall academic performance (Graham & Perin, 2007). The development of fluent writing is particularly important, as it has been shown to be a strong predictor of global writing quality (Malecki & Jewell, 2003). Limited research exists on writing interventions specifically targeting writing fluency. While performance feedback procedures have been found effective for increasing writing fluency (Hier & Eckert, 2016), interventions such as story-mapping and self-regulation strategy development (SRSD), which target higher order writing skills, have also been shown to improve writing fluency abilities (Harris, Graham & Mason, 2006; Li, 2007). Research also indicates reading and writing share similar learning processes (Nuemann & Dickinson, 2001). The current studies examine the impact of two writing interventions on the writing fluency, writing quality, and oral reading fluency abilities of elementary school students. The first is a writing intervention structured after the repeated reading intervention, incorporating a modeling component. The second is a planning intervention, which involves timed practice using a graphic organizer to plan a narrative composition. The impact of each intervention, and the order in which they are delivered, was examined. Results of the current studies demonstrated marginal to moderate growth in writing speed (TWW) for three participants first introduced to the repeated writing intervention, and marginal growth in writing speed for two participants initially delivered the planning intervention. Substantial improvement in writing accuracy, writing quality, and oral reading fluency was not found.

## INTRODUCTION

The development of literacy, the ability to read and write, is essential to academic and career success (Puranik et al. 2016). Although reading understandably consumes a large portion of attention in curriculum, students' writing skills deserve comparable consideration. During school, students spend nearly 30-60% of their time writing on paper, and many employed Americans require competent writing skills to succeed in their positions (McHale & Cermak, 1992; National Commission on Writing, 2003). Many positions in the workplace require written reports, presentations, and frequent written communication through e-mail or other mediums; therefore, the lack of competent writing skills greatly limits the breadth of opportunities available.

Writing also functions as an effective instrument for communication, which in turn serves as a principal medium for assessing academic performance (Graham, MacArthur, & Fitzgerald, 2007). Students are often required to convey the material they learned in courses through writing (Koenig, Eckert, & Hier, 2016). Research suggests writing also positively influences learning, as a meta-analysis found writing about material enhanced student performance in multiple school subjects, including social studies, mathematics, language arts, and science (Bangert-Drowns, Hurley, & Wilkinson, 2004). Struggling writers are less likely to use writing as a device to help support the learning of content in classes; therefore, their grades in classes likely suffer in comparison to students with stronger writing skills (Graham & Perin, 2007). Specifically, handwriting, compared to keyboarding, has also been shown to substantially impact the development of foundational writing skills, further demonstrating the importance of its instruction, despite the increased use of technology in our society (Berninger et al., 2009). Due to evidence of the impact of writing on achievement, the Common Core Standards requires

students to master certain writing skills at each grade level. For instance, by the 4<sup>th</sup> grade, the Common Core Standards require students to write informative and exploratory essays, in addition to other skills, such as using transitions (Kim et al., 2018; National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010). Additionally, the standards emphasize the usage of writing as an instrument to support learning across subjects (Graham, Herbert, & Harris, 2015).

Although writing remains a prevalent component in instruction and assessment in schools, a considerable portion of students struggle to meet writing standards for their grade. According to the National Assessment of Educational Progress, 70% of students fail to demonstrate writing proficiency by the eighth and twelfth grade. Evidence also reveals deficits in writing skills occur early on, as only 28% of fourth-grade students demonstrated proficient writing skills according to national estimates in 2002 (Persky, Daane, & Jin). These results call for concern, as writing difficulties are related to lowered chances of college acceptance, increased chances of dropping out of school, and overall lower academic achievement (Graham & Perin, 2007).

In view of the impact of writing skills on academic achievement, addressing writing deficits early on may aid in preventing gaps in proficiency. Evidence suggests intervention targeting literacy skills during primary school provides greater benefits compared to intervening later (Slavin, Madden, & Karweit, 1989). Intervening during the years when the writing difficulties emerge may help student develop proficiency (Graham & Harris, 2002). Developing effective writing interventions for use during elementary school years may help prevent deficits in writing and general academic achievement.

## **Importance of Writing Fluency**

Writing consists of multiple components, which creates the challenge of determining the area to target during instruction (National Commission of Writing, 2003). While instruction geared toward each writing component may bring about various benefits, writing fluency (i.e., the ability to write with speed and accuracy) may be especially important when examining students with writing difficulties (Berninger et al., 2006; National Commission of Writing, 2003). Students must first develop fluency in writing to sustain long periods of writing, apply writing skills to more complex assignments, and overall effectively display writing skills (Binder, 1996). Targeting writing fluency may benefit writing quality and general academic achievement.

From a cognitive perspective, increasing writing fluency allows students to devote greater attention to higher order activities, such as planning and creativity, by reducing the amount of attention geared toward basic writing tasks (Bloom, 1986; Haughton & Bateman, 2006). Students with writing difficulties mainly concentrate on generating words rather than planning, evaluating, or revising their product (Graham & Harris, 2005). For students struggling to create content with adequate speed and accuracy, concentration and effort toward the higher-order tasks relating to writing quality becomes limited, which in turn leads to less intricate and effective written compositions.

Connections between writing fluency and other indicators of writing quality further demonstrate the importance of the foundational component. For instance, Jewell and Malecki (2005) found fluency was strongly associated to other writing indices and global indicators of writing ability. Writing fluency is correlated with standardized and criterion measures of writing achievement, demonstrating a connection between fluency and writing quality (McKaster &



Espin, 2007). Evidence also reveals a connection between writing fluency and postsecondary educational achievement (Calfree & Miller, 2007). Considering these findings, designing and implementing interventions specifically targeting writing fluency would likely contribute to students' growth in writing quality and academic success.

### **Response-to-Intervention (RTI) Model**

It is important to examine the approach taken for academic intervention implementation. Many schools currently utilize the response-to-intervention (RTI) method for identifying, treating, and monitoring students in need of intervention. Batsche et al. describes the RTI model as “the practice of providing high-quality instruction and interventions matched to student need, monitoring progress frequently to make decisions about changes in instruction or goals, and applying child response data to important educational decisions” (2005). RTI plays an important role in intervention selection. Services are delivered across three tiers, depending on the academic and behavioral needs of the students. Intensity and time of intervention increases with each tier.

Tier 1 includes the universal instruction delivered to all students (Fuchs & Fuchs, 2007). Ideally, schools will implement high-quality instruction to ensure the instruction is effective for most students. Effective tier 1 curriculum is established when at least 80% of the students respond by not exhibiting academic difficulties. Students in tier 1 are screened three times a year to monitor their progress. Certain benchmarks are set during the fall, winter, and spring, to discern if students are performing adequately or are “at-risk” for falling behind academically. The level of risk is determined based on how far below the benchmark their score is for each measured skill area.

Students that do not respond to tier 1 instruction are placed in tier 2 intervention. These students receive longer more individualized instruction in areas where they are not adequately achieving (Gresham, 2007). For instance, tier 2 may occur in the form a small group reading intervention that occurs for 30 minutes three times a week for students deemed “at risk” according to their benchmark screening. Students receiving tier 2 targeted intervention are assessed every two weeks to examine their growth.

Tier 3 includes students who did not show adequate growth in tier 2, thus they require more intensive intervention (Walker & Shinn, 2010). Tier 3 services are longer-lasting (i.e., 30-45 minutes per day) and more individualized to help close the gap of achievement the student is experiencing. Students in tier 3 are provided intervention daily and monitored for progress weekly. Often, students who do not respond to tier 3 intervention are referred to special education evaluation, after multiple methods of evidence-based practice have been implemented over a long enough period to demonstrate lack of sufficient progress.

Each of the tiers serve the purpose of providing students with the level and intensity of instruction required to succeed; however, it is important to implement evidence-based interventions to students at all levels. Regarding writing skills, schools have the responsibility to determine which components to assess and target during intervention. Specific benefits come from targeting various components of writing (i.e., vocabulary, fluency, grammar); therefore, deciding which area to target will depend on the deficits of the students and research demonstrating which interventions are most effective in improving writing skills.

### **Writing Fluency Assessment**

Within the RTI system, it is important to regularly assess students’ writing skills at each level to ensure they are making adequate growth, as progress monitoring is associated with

educational gains (Fuchs, Fuchs, Hamlet, Walz, & Germann, 1993) One of the empirically developed measures used to assess writing fluency is the curriculum-based-measure in written expression (CBM-WE). Curriculum-based measures are timed probes which allow educators to screen and monitor their students' performance on specific skills. They allow for quicker and more frequent assessment compared to standardized assessment tools. The CBM-WE, defined by Shinn (1989), includes a writing prompt in the form of a story-starter, picture, or sentence providing a purpose of writing (Gansle & Noell, 2010). The procedures involve providing students with the prompt, followed by 1 minute of planning, and then giving them a specific amount of time to complete the writing task. Evidence suggest the 3-minute and 5-minute timed CBM-WE measures provide the most accurate measures of writing fluency (McMaster & Espin, 2007). Indices measured on the CBM-WE commonly include the total number of words spelled correctly (WSC), total words written (TWW), and number of correct word sequences (CWS). These are considered production dependent indices, since they are contingent upon the length of the composition (Gansle & Noell, 2010). Production-independent measures include the percentages (i.e., %WSC) which measure the accuracy of the writing probe. For instance, the percentage of correct word sequences (%CWS) measures the percentage of adjacent words that are correctly spelled, capitalized, and use proper grammar.

CBM-WE measures have been successful in identifying students with writing difficulties, particularly with the measure of %WSC (Parker, Tindal, & Hasbrouk, 1991). Additionally, they have been shown to be easily administered, have high reliability with regular administration, and are sensitive to growth, making them ideal for progress monitoring (Goo, Watt, Park, & Hosp, 2012). When monitoring response to writing fluency interventions CBM-WE measures serve as a useful tool for evaluating their effectiveness.

## **The Process of Writing**

Prior to designing writing fluency interventions, one must first understand the process of writing and consider the factors pertaining to its instruction. In 1978, Hayes and Flower created a theoretical account of the writing process, which involved three major processes. These components included planning, translating, and editing (Hayes & Flower, 1978). This account remains consistent with some current views of advanced writing; however, it has also been criticized for neglecting developmental processes applicable to beginning writers (Berninger, Mizokawa, & Bragg, 1991; Graham, Berninger, Abbot, Abbot & Whitaker, 1997). In 1994, Berninger and Swanson adapted the model. They divided the component of translating into two components, text generation and transcription (Koenig, Eckert, & Hier, 2016). Text generation includes the formation of ideas into verbal representation, and transcription involves putting the representations into text (Koenig, Eckert, & Hier, 2016). The model became known as the Simple View of Writing, which included the components of transcription, text generations, and executive functions (Berninger et al., 2002; Koenig, Eckert, & Hier, 2016). The components of the model align with the current view of the writing process, which supports instruction.

The process of writing can be divided into the stages of planning, transcribing, reviewing, and revising (Gansle & Noell, 2010; Isaacson, 1985). Planning entails organizing and developing the message to fit the purpose of the work (Graham & Harris, 2005). Although the sequence of writing is not always consistent, planning is usually the first step in creating a composition. Transcribing involves the process of forming words, sentences, and paragraphs (Abbot & Berninger, 1993). Transcribing involves skills such as capitalizations, grammar, and punctuation. This component involves the actual text making up the composition. The stage of reviewing entails examining the written content and comparing it to the intended purpose and

outcome of the composition (Gansle & Noell, 2010). Reviewing includes inspection of organization, mechanics, and overall content of the work. The final stage, revision includes making any changes necessary to improve the composition and make it more closely match the intended outcome (Gansle & Noell, 2010).

The stages of writing may not always occur in the order described, but generally describe the components required for proficient writing skills. In fact, competent writers tend to perform each of the stages simultaneously (Howell & Nolet, 2000). Unlike reading or mathematics, skillful writing is less easily defined; therefore, understanding the process of writing creates a greater challenge for better understanding of methods for writing assessment and instruction.

### **Relationship Between Reading and Writing**

The connections between reading and writing should be considered when creating or building upon writing interventions. Although the process of writing involves different stages, such as planning, which differ from the act of reading, the two skills share similarities in their process of development. According to James Squire's (1983) model of the relationship between reading and writing, the two skills share similar thought processes. This can be viewed by examining the similarities of comprehending during reading and composing during writing. For example, a reader recalls information pertaining to the text in preparation of comprehension, similar to the way a writer calls to mind past knowledge of the topic prior to composing (Heller, 1999). The behaviors that occur during composing and comprehending also share similar demands. For example, a reader is actively involved in reconstructing the author's meaning as they move through the text, which involves monitoring of thought (Palinscar & Brown, 1984; Heller, 1999). Writing also requires active thought and construction of meaning during composition, as writers must constantly examine their choices of words and sentences to ensure

they are forming the purpose of their composition (Heller, 1999). The processes that occur after reading and writing can also be compared in that readers reflect and analyze meaning after completing a passage; similarly, writers reflect upon their work after finishing to ensure they met their intended purpose, often leading to revisions (Heller, 1999). Considering the inseparability of thought and language, the similarities between the mechanisms that occur prior to, during, and after reading and writing are not unexpected (Vygotsky, 1962, 1979).

Reading and writing also share similarities in their development of proficiency. For example, during reading students first learn to identify single letters, followed by the recognition of complete words and sentences. This compares to the way learning to write involves first learning to correctly form letters and words before creating complete narratives (Nueman & Dickinson, 2001). Just as gaining competence in reading abilities leads to increased comprehension abilities, gaining proficient writing skills allows for the formation of more meaningful compositions.

The two tasks also tend to utilize similar styles of instruction, as explicit comprehensive instruction has been demonstrated as the most effective method for developing writing and reading abilities (Pearson & Dole, 1987). This type of instruction involves modeling and explaining, what, how, why and when a comprehension strategy should be used (Pearson & Dole, 1987). This is followed by guided practice, in which student independence is scaffolded, allowing the student to correctly learn the skills and gradually gain confidence in their abilities. Lastly, the instructor helps the student apply the skills learned to new situations (Pearson & Dole, 1987).

Considering the connections reading and writing share regarding development and instruction, it is unsurprising that comorbidity rates have ranged from 30-75% for students with

learning disabilities in writing and reading (Graham & Hebert, 2011). Research also reveals instruction in reading can improve writing skills, and vice versa, further demonstrating the relationship between the skills (Graham & Hebert, 2011). Theoretical accounts for the relationship between reading and writing instruction vary; however, it has been proposed that the cognitive processes and shared knowledge between reading and writing lead to the outcome of improved abilities in both domains (Fitzgerald & Shanahan, 2000). For instance, shared knowledge may include representations of various linguistics properties, such as phonemic, orthographic, and semantic properties (Tierney & Pearson, 1983; Fitzgerald & Shanahan, 2000). Deficits in the knowledge of one or more of these may impact reading and writing in different ways; however, recognizing the relationship between the properties of knowledge both skills share may help contribute to their effective instruction.

### **Reading Components**

Prior to exploring methods of reading instruction, one must consider the different areas of reading proficiency. It may be useful to compare the process of writing with the stages of reading development to best understand why certain types of instruction are successful with improving reading skills and how this may relate to writing instruction.

Developing proficient reading skills requires mastery of each of the five components of reading, including phonemic awareness, alphabetic principle, fluency, vocabulary, and comprehension. The Report of the National Reading Panel (NRP, 2000) reports that each of the core components of reading interact with each other; therefore, competency in each area is required to establish proficient reading, suggesting instruction must target all components.

The first component, phonemic awareness involves an individual's ability to manipulate the individual phonemes in words. Phonemic awareness is shown by a student's capacity to

break down an orally read word into separate phonemes (e.g., “What are the sounds in ‘map’?” “/m/ /æ/ /p/”.) Students must be able to hear and produce the correct phonemes to demonstrate mastery. Evidence indicates early phonemic awareness abilities strongly predicts students’ ability to learn to read later on (Foorman, Breier, & Fletcher, 2003).

Alphabetic principle, also known as phonics, refers to the ability to correctly identify letter-sound relationships, blend letter sounds together to form words, and divide words into letter sounds. The component of alphabetic principle differs from phonemic awareness in that it refers to the expected relationship between printed letters and sounds we orally produce rather than only the sounds of verbal language (Moats, 2000; NRP, 2000). A meta-analysis conducted by the National Reading Panel (NRP) revealed alphabetic principle instruction improved students’ overall reading and spelling skills, in addition to word blending and phonetic segmentation. The results suggest the development of phonics skills aids in the development of the third component, fluency.

Reading fluency is defined as the ability to read text quickly, accurately, and with proper expression (Marcotte & Hintz, 2010). The three components of reading fluency include automaticity, reading rate, and prosody. Automaticity is the speed and accuracy of recognizing words, which is achieved when an individual immediately recognizes a word upon seeing it (Marcotte & Hintz, 2010). Reading rate refers to the agility, measured by words read per minute, with which students read connected text (Marcotte & Hintz, 2010). An insufficient reading rate can hinder a reader’s ability to understand the text, even if read accurately. Among all components, fluency is ascertained as the most prominent feature of proficient reading (Adams, 1990). The component is often measured by the curriculum-based measure (CBM) of reading, oral reading fluency (ORF), which is considered an indicator of overall reading abilities



(Petscher et al., 2013; Fuchs, Fuchs, Hosp, & Jenkins, 2001). Reading fluency serves an indicator of reading achievement because it encompasses all the prerequisite components of reading preceding comprehension. Fluency of reading is indicative of phonemic awareness and phonics mastery, and although comprehension may not always accompany successful fluency, it is a strong predictor of the former (Marcotte & Hintz, 2010).

The fourth component, vocabulary, is the ability to understand the meaning of words (Marcotte & Hintz, 2010). Vocabulary can be defined by oral vocabulary, understanding words read aloud, and reading vocabulary, understanding the meaning of words in the form of text. Knowledge of the meaning of words can directly impact comprehension. For instance, a student misunderstanding the meaning of a word, or multiple words, can lead to lack of comprehension of a sentence or entire passage.

This leads us to the fifth component, comprehension. Reading comprehension is defined as the ability to understand the meaning of text (Adams, 1990). Each component contributes to the understanding of text, as reading accurately and with understanding of the meaning of words is necessary for comprehending the message of the passage. The goal of reading is to comprehend; therefore, this final component is pivotal to competent reading abilities.

### **Reading Fluency Intervention**

Considering the similarities between reading and writing, it may be useful to examine methods of instruction aimed at their shared components. Although research on interventions specifically targeting writing fluency are limited, ample evidence exists on reading fluency instruction. Examining best practices for increasing reading fluency may offer insight into factors leading to successful writing fluency interventions.

One of the most researched explicit methods of reading instruction is the repeated reading model of intervention. Numerous studies have found repeated reading effective for increasing students' reading fluency (Therrien, 2004). The process of repeated reading involves presenting a passage to a student at their targeted level and instructing them to read it multiple times with corrective feedback. Improvement in reading skills through repeated reading has been demonstrated by students' increase in oral reading fluency (ORF), which is an indicator of reading proficiency (Therrien, 2004; Fuchs, et al., 2001). Repeated reading intervention has also been shown to increase ORF for both students with learning disabilities and typical learners, as well as students at both the elementary and secondary grade level, demonstrating the usefulness of the intervention across multiple populations (Freeland, Skinner, Jackson, et al. 2000). Additionally, evidence reveals improving reading fluency leads to improvement in reading comprehension, further demonstrating the value of repeated reading instruction. Unsurprisingly, repeating reading has been shown to improve levels of accuracy and overall reading scores, in addition to fluency and comprehension, on standardized reading tests (Begeny, Daly, & Valleley, 2006; Chard, Vaughn, & Tyler, 2002; National Reading Panel, 2000).

Additional instructional components incorporated with repeated reading have also been examined. For instance, modeling, which involves the peer or instructor reading the passage aloud before the student reads, is often utilized (Therrien, 2004). Although an adult or peer can serve as a model, it is important that they read with a rate slightly faster than the student, read with expression, and correctly use intonation (Meyer & Felton, 1999). Modeling has been shown to help develop self-efficacy and self-regulation skills in reading and writing; however, the research on the impact of modeling in repeated reading instruction is limited (Schunk &

Zimmerman, 2007). Modeling may also help reduce frustration and encourage participation among struggling learners.

Another component included during repeated reading is corrective feedback. While receiving correction is essential to the model of intervention, the way it is delivered can vary. For instance, correction of mispronunciations or omissions of words may occur during, such as when the error occurs, or after instruction (Therrien, 2004). Corrective feedback can also include phrase drill error correction, which is a procedure that involves (a) the instructor providing consequent modeling and (b) directing the student to repeatedly practice the phrase from the text where the error occurred (Begeny, Daly, Valleley, 2006). This may involve instructing the student to correctly read a phrase where a word was mispronounced (i.e., “the girl ran quickly”) three times after the instructor modeled the correct phrase. Although this method is sometimes included with repeated reading, evidence suggests phrase drill error correction alone provides substantial improvements to ORF comparable to repeated reading procedures (Begeny, Daly, Valleley, 2006). This may be the result of phrase drill providing targeted rehearsal practice of problematic units of text.

It should also be noted that although repeated reading is supported by an ample literature on reading fluency intervention (Therrien, 2004), other methods of explicit instruction have been used to improve fluency. For example, instruction focused on phonics and vocabulary have also been shown to lead to improvement in reading fluency (Solomon et al., 2017). As previously described, each of the components of reading are related; therefore, interventions geared toward improving other areas of reading are likely to contribute to growth in reading fluency.

## **Best Practices for Writing Instruction**

The Common Core State Standards (CCSS; National Governor's Association & Council of Chief School Officers, 2010) have identified writing instruction as a priority. The skills targeted during each grade levels varies. Skills taught during elementary school years include spelling, grammar, sentence construction, as well as methods of planning and revising their work (Graham et al., 2012). Students are also instructed on how to write various forms of compositions, including persuasive, narrative, and informative texts (Graham et al., 2012). Instruction of these skills becomes more advanced with each grade level, and instruction focuses more on the complex components of writing during secondary years.

Among the interventions targeted specifically for increasing writing fluency, performance feedback is one of the most empirically validated methods. Performance feedback can be delivered in a variety of ways; however, it is generally defined by providing information about a student's performance on one or more aspects of their written composition. The success of performance feedback is attributed to the manner in which it allows individuals to compare their behavior or performance to a desired standard of performance, which then leads to motivation to alter their performance (Koenig, Eckert, & Hier, 2016; Kluger & DeNisi, 1996).

Performance feedback writing interventions have been found to reliably produce moderate to large outcomes for improvement in writing skills (Truckenmiller et al., 2014; Eckert, 2009). Specifically, performance feedback has been shown to successful increase students' writing speed (Hier & Eckert, 2016). One study which demonstrated the direct impact of performance feedback was a single subject experiment in which elementary school students with learning disabilities received performance feedback, along with a self-scoring component, which resulted increased length and quality of writing (Harris et al., 1994). Recent studies have also

demonstrated the impact of performance feedback interventions on class-wide writing fluency (Hier & Eckert, 2014; Truckenmiller et al., 2014). A randomized control trial, which assigned elementary school students to either an individualized performance feedback condition, practice only condition, or instructional condition, resulted in increased writing speed, measured by total words written (TWW) for students in the performance feedback condition (Truckenmiller et al. 2014).

Some studies have also examined the impact of goal setting combined with performance feedback. For instance, Alitto et al. (2016) found students significantly increased their writing speed, measured by production dependent indices (i.e., total words written (TWW), words spelled correctly (WSC), correct word sequences (CWS)), in response to adult and peer facilitated performance feedback and goal setting practices. However, another study found that performance feedback procedures alone resulted in increased writing fluency, also measured by production dependent indices, when compared to the incorporation of a goal-setting component (Koenig, Eckert, & Hier, 2016).

Evidence supports the use of performance feedback procedures for the improvement of writing fluency; however, it is also important to consider its current limitations. For instance, studies have demonstrated the success of performance feedback in improving writing speed, as measured by production dependent indices; however, studies have demonstrated a lack of significant improvement for accuracy, or production independent indices (i.e., percentage of words spelled correctly (%WSC), percentage of correct word sequences (%CWS) (Alitto et al., 2016; Truckenmiller et al, 2016). Although increasing writing speed alone is a notable success of performance feedback procedures, interventions that significantly improve accuracy under timed conditions would be greatly beneficial to students with writing difficulties.

Additionally, performance feedback has been shown to produce long-term maintenance or generalization of the skills gained during intervention (Hier & Eckert, 2016). Considering the gaps in writing proficiency, is it important for writing interventions to demonstrate maintenance of the skills they target. Generalized writing fluency skills also play an important role in learning, as they allow students to apply their skills to different areas of content (Hier & Eckert, 2016; Baer et al., 1968). According to Haring and Eaton's (1978) hierarchy of skill development, the phases of learning include acquisition, fluency, generalization, and adaption. Fluency, which is defined as the speed and accuracy of a skill, must occur before generalization and adaption. Applying this heuristic of learning to writing, students must first learn to form words and sentences quickly and correctly before being able to apply their skills to other areas. Perhaps the current research, indicating improvement primarily in speed in response to performance feedback, suggests the need for procedures also creating substantial growth in accuracy.

While performance feedback is one of the most supported evidence-based practices proven to improve writing fluency, research also demonstrates where other types of intervention have been successful. For instance, multiple studies have examined the impact of sentence construction intervention on sentence writing fluency (Datchuck, Kubina, & Mason, 2015; Saddler & Graham, 2005). A common method for helping students form simple sentences more fluently involves presenting students with picture-word prompts, in which they are directed to form as many sentences as possible based on the prompts for a specific time period. Sentence construction instruction (SI) with picture-word prompts has been shown to increase students' ability to form sentences more quickly and accurately (Datchuck, Kubina, & Mason, 2015; Anderson & Keel, 2002).). A recent study also examined the impact of sentence instruction (SI) with picture-word prompts combined with frequency building to a performance criterion on the

writing skills of elementary school students with emotional and behavioral disorders, which resulted in an increased frequency of simple sentence construction (Datchuk, Kubina, & Mason, 2015). Frequency building to a performance criterion (FBPC) involves dividing practice into timed trials, where performance feedback is given after each trial, and the trials are built up to specific goal (Kubina & Yurik, 2012; Datchuk, Kubina, & Mason, 2015). According to the skills-based approach (Datchuk & Kubina, 2013); in addition to writing speed, targeting simple sentence construction among struggling writers can also improve skills such as syntax and punctuation, indicating sentence instruction intervention can lead to improvements in writing fluency and overall quality.

Sentence construction instruction has also focused on the production of complex sentences. For example, sentence combining is an intervention that instructs students to combine two simple sentences to create more complex sentences (Graham et al., 2012). Although it does not specifically target writing fluency, it has been shown to increase word count and writing quality of elementary school students (Saddler, 2005). Learning to form complex sentences likely aids in the overall effectiveness of written compositions, as the intended meaning is presented in a more sophisticated manner. Evidence also reveals peer-assisted sentence combining strategies led to improved sentence construction and story quality for students with disabilities, further demonstrating the versatility and usefulness of the intervention (Saddler, Asaro, & Behforooz, 2008).

Story-mapping is another procedure commonly used to help students improve their writing quality. It has been shown to increase the writing speed and content quality of students with learning disabilities in narrative forms of writing; however, story-mapping has limited evidence of improvement in writing accuracy (Li, 2007). Story-mapping involves the use of a

graphic organizer to facilitate logical narrative construction. Evidence also suggests modeling the use of a story-map may help students learn the process and apply it to their writing (Li, 2007). Considering the stage of planning in the writing process, the rehearsal of planning ideas prior to forming a composition likely increases fluency by freeing up attention during the transcription stage.

Another form of intervention which targets planning, in addition to editing and revising skills, is self-regulated strategy development (SRSD) (Graham & Perin, 2007). SRSD was developed based on the assumption that students with learning and behavioral difficulties experience a combination of affective, behavioral, and cognitive experiences, in addition to environmental variables, which contribute to their difficulties with learning (Harris & Graham, 1999). The idea that children, particularly those with learning difficulties, require greater amounts of explicit instruction was an important assumption that contributed to the development of SRSD, as methods of explicit instruction are central to the model (Harris & Graham, 1999). In light of these assumptions, SRSD attempts to create adaptable systems of explicit instruction which target students' cognitive, affective, and behavioral needs.

SRSD also teaches self-regulation skills, such as self-talk, in conjunction with strategies related to planning, editing, and revising (Koster, Bouwer, & van der Bergh, 2007). The inclusion of self-regulation strategies seeks to provide students emotional and behavioral skills relevant to writing (Graham & Perin, 1999). Other specific self-regulation skills may include goal setting, self-monitoring, or self-reinforcement, which contribute to students' independent use of the strategies learned during the explicit and systematic instruction of writing skills (Harris, Graham, & Mason, 2006). Research also indicates self-regulation strategies, in conjunction with explicit instruction of the writing process, can help students remain motivated



during writing, as students who received SRSD demonstrated improvement in measures of effort and intrinsic motivation when composing narratives (Harris, Graham, & Mason, 2006).

Beyond improvement in motivation, success of SRSD implementation is often assessed by the measurement of several skills (i.e., vocabulary, ideation, organization) using rubrics specific to the skills being targeted (Graham & Perin, 2007). Evidence indicates SRSD may be most beneficial for the improvement of higher-order writing skills and overall writing quality compared to more basic writing processes, such as fluency. However, evidence of SRSD's success on increasing words count suggests building upon certain processes of writing, such as planning, may also lead to an increase in writing fluency (Harris, Graham, & Mason, 2006).

### **Potential Barriers to Writing Proficiency**

In view of the types of instruction found to be effective for improving writing fluency, among other components of writing, it may be beneficial to consider more specifically the potential causes of writing difficulties and reasons certain types of instruction are successful, or unsuccessful, in improving writing skills. As previously discussed, writing is a complex process with multiple variables. This can create challenges when targeting which area to assess or target during instruction, especially when helping students with writing difficulties, as the cause of their deficit may be unclear. For instance, students struggling to create complete sentences would likely benefit from an intervention explicitly targeting sentence construction. Evidence has shown that developing writers often have more ideas than what they are able to transcribe, as their lack of fluency restricts their ability to write them (Hayes & Berninger; Puranik et al., 2016). However, the student may also benefit from practice with organization, as strategies such as SRSD have been shown to also improve foundational skills (Harris, Graham & Mason, 2006). Research indicates skilled writers spend a considerable amount of time planning, which can

include goal setting, creating ideas, or organizing ideas; however, it is not apparent when they developed planning skills and/or writing proficiency (Flower & Hayes, 1980; Harris, Graham, & Mason, 2006). Although it makes sense to focus on foundational writing instruction for students struggling with skills such as fluency, targeting high-order skills either during or before instruction of basic skills may provide benefits, bearing in mind the complexity of writing.

Additionally, the lack evidentiary support for the significant improvement of the accuracy component of fluency in response to performance feedback procedures suggests further exploration of potential barriers to the development of writing fluency are needed (Alitto et al., 2016; Truckenmiller et al., 2016). This may include considering the relationship between reading and writing by examining similarities between reading and writing fluency. Both reading and writing fluency are commonly used as indicators of proficiency of the skills; however, high writing fluency as indicated by only production dependent indices may not necessarily demonstrate competent writing skills (Marcotte & Hitz, 2010; Malecki, 2014). Making errors during reading varies from the manner in which errors occur during writing; however, the principles of providing explicit instruction and error correction apply to both skills. Considering these similarities, it may be useful to examine methods for increasing reading accuracy when adjusting performance feedback method to better improve writing precision.

Although the literature on interventions targeting writing fluency is limited, considerable information exists regarding important variables related to writing instruction, the process of writing, and the connection between writing and other skills, such as reading. Considering the current gaps in writing achievement, it would be advantageous to extend the literature by integrating work to develop fluency in reading and writing. In order to find successful and efficient methods for increasing writing fluency, it is necessary to consider the methods already

found effective, such as performance feedback, and adapt them in ways to yield more comprehensive benefits.

### **Purpose of the Current Studies**

The first experiment will examine the impact of a writing fluency intervention, modeled after the repeated reading intervention, on elementary students' writing fluency as measured by production dependent (TWW, WSC) and production independent indices (%WSC). In consideration of the evidence supporting the growth of oral reading fluency following repeated reading intervention, it is likely that a similar model of instruction will be successful when applied to writing. Students will practice correctly writing revised compositions of their own narratives. This will examine whether rewriting passages created by participants independently contributes to gains in speed and accuracy of writing. Considering the existing literature on performance feedback demonstrating that students grow when provided correction on their writing (Hier & Eckert, 2016); it is hypothesized that using their own work as a model may help make the intervention more effective, compared to instructing them to copy random passages (Moore, 2019).

The experiment will also introduce the participants to a separate intervention targeting planning skills. The intervention will examine if practice with timed planning of narrative compositions leads to increases in writing fluency. Research indicates students with writing difficulties have less understanding of how to create and organize ideas for a composition, suggesting practice with planning skills may aid in reducing writing problems (Graham & Harris, 2000). The experiment will examine whether the introduction of the repeated writing intervention alone results in initial fluency gains and if intervention targeting planning skills helps to further increase fluency.

The second experiment will examine how the timed planning practice, when introduced as the first method of intervention, impacts writing fluency. Experiment 2 will follow the same procedures as Experiment 1; however, the planning intervention will occur prior to the repeated writing practice. This will evaluate if practice with planning initially results in increases in fluency, and if repeated writing intervention contributes to potential growth in speed and accuracy.

The two studies will provide insight into the function of writing fluency deficits and methods for meeting participants' learning needs. For example, if students primarily struggle with producing ideas and transcribing them in an organized manner, their fluency likely suffers as a result of insufficient speed of thoughts pertaining to the topic of interest. A slower speed of writing caused by inadequate planning skills may also reduce the amount of opportunities to form complete sentences and passages, which may hinder the progress of learning technical writing skills, such as spelling and sentence structure.

Conversely, students exhibiting difficulties with understanding foundational writing skills may devote too much attention to technical tasks, such as forming words, which may hinder higher-order skills, such as planning (Bloom, 1986; Binder, Haughton, & Bateman, 2002). In such case, focusing on planning initially may not prove beneficial, as the lack of basic writing abilities could serve as a barrier to using a more complex skill.

The purpose of the current studies was to evaluate the impact of a writing fluency intervention structured after a successful reading intervention, in addition to an intervention targeting fluent planning skills, on writing fluency. The studies will also examine the impact of the order of intervention implementation. Additionally, considering the common elements between writing and reading development, changes in oral reading fluency were evaluated.

Through examining writing interventions that target distinct components of writing competence, the experiments aimed to help contribute to the literature on effective methods for increasing writing fluency among elementary school students.

## **METHODS**

### **Experiment 1 – Fluency Intervention First**

#### **Participants and Setting**

Three third grade students and one fourth grade student, two male and two female, were recruited from a local elementary school. Parental consent and child assent were obtained for each participant prior to engaging in any study procedures. Sessions took place in an empty classroom at the school.

#### **Eligibility Criteria**

Participants identified as struggling writers by their teachers were recruited. Students were screened using Curriculum-Based Measure in Written Expression (CBM-WE). In order to be eligible to participate in this experiment, participants needed to score at or below the 60<sup>th</sup> percentile for their grade level based on national norms (Malecki & Jewell, 2003). In order to assure that participants had necessary prerequisite skills, they were required to be able to write at least 10 words in 3 minutes to be included in the study. The screening probes were also be scored for legibility. Participants with less than 90% of legible words were excluded to avoid including participants who needed prerequisite letter writing instruction.

#### **Materials**

The experimenter provided CBMs in written expression, which consist of a story starter and three minutes of timed writing. Students were supplied with writing materials to complete the CBMs.

Writing samples for the intervention were created for each participant based on his or her writing samples. The model writing samples consisted of several sentences adapted from each participant's own writing. Participants' writing samples from baseline or previous sessions were

copied and revised by the experimenter to provide error free models. The sentences were spaced out to allow room for the student to write underneath each line. The length of the writing samples was based on each participant's baseline TWW (50% longer than their approximated TWW for one minute) and adjusted based on progress in the intervention (see below).

Graphic organizers (Appendix B) were used during the experiment. The organizer included a section for the beginning, middle, and end of the written passage. Each section included five lines underneath each header to allow for planning details.

Participants received rewards (e.g. pencil, sticker, coloring time) contingent upon meeting his or her goal during each intervention session. Rewards were selected by asking participants, prior to intervention implementation, about their preferred prizes. A prize box was created with nine rewards options, based on the preferences of all participants. A reward menu listed all the possible rewards to be traded in for points earned during the intervention, with each prize costing one point. Participants were able to earn up to three points each session and could trade them in for prizes. Edible rewards (candy) were also offered to participants as part of the CBM-WE reinforcement component (described in Experimental Design).

The experimenter used CBMs in oral reading fluency (CBM-ORF) to measure the number of words read aloud per minute by participants. The CBM-ORFs consisted of one-page grade level passages in which the experimenter instructed participants to read aloud for one minute. The number of words read correctly in one minute were recorded. The experimenter administered these to participants using a multiple probe design to examine the impact of the writing intervention on the participants' ORF.

A qualitative writing rubric (Appendix A) was used to score participants' quality of writing on the CBM-WE probes. The rubric included criteria from the Test of Written Language - Fourth Edition (TOWL-4) which assess organization and composition of a passage.

### **Response Definitions, Data Collection Procedures, Inter-rater Reliability and Inter-Observer Agreement**

The experimenter administered a CBM-Written Expression probe at the beginning of each session. The probe was used to measure the primary dependent variable, writing fluency, based on the total words written (TWW), words spelled correctly (WSC) and percentage of words spelled correctly (%WSC). Writing probes were scored using the techniques defined in Powell-Smith and Shinn (2004). TWW was scored by counting the total number of legible words written by the student, including incorrectly spelled words. WSC was calculated by circling incorrectly spelled words, using judgement of appropriateness of context, and subtracting the amount of incorrectly spelled words from the amount of TWW. The %WSC was scored by dividing the total WSC by the TWW.

Inter-scorer agreement (ISA) of writing fluency was obtained for 60% of probes. Scorers were trained on the scoring of CBM-WE probes. ISA was attained for all indices (TWW, WSC, %WSC). For TWW and WSC, this was calculated by counting each word as an agreement or disagreement. The number of agreements divided by the number of agreements plus disagreements was multiplied by 100 to calculate ISA. For %WSC, ISA was calculated at the ratio of WSC divided by TWW. Inter-scorer agreement was 99.92% for TWW, 99.67% for WSC, and 99.67% for %WSC.

Regarding qualitative writing quality, ISA was obtained for 31% of probes. Scorers were trained to obtain at least 80% accuracy on the Story Composition Rubric (Appendix A). ISA was



calculated by dividing the smaller score by the larger score among scorers and multiplying that outcome by 100. ISA was 87.82% for qualitative writing quality.

## **Experimental Design**

This study used a multiple baseline across participants design with four phases, Baseline, Fluency Intervention, Planning Intervention, and Maintenance. Writing probes were delivered during baseline and at the start of each session of writing instruction. Sessions occurred approximately 2 times per week over approximately 18 weeks. Excluding school closure times, including winter break, sessions occurred with participants for approximately 12 weeks.

**Baseline.** Baseline sessions consisted of data collection (administration of CBM-WE) without intervention. Each student was encouraged to try their best and provided with praise for participation after completing each CBM. The researcher also implemented a CBM-WE reinforcement component during Baseline, Intervention, and Maintenance phases. This component provided reinforcement for meeting a specific goal of TWW on the CBM-WE. The purpose of this component was to eliminate the factor of motivation on participants' performance. The CBM-WE reinforcement component provided three mystery goals (1 = 10% increase in previous score on CBM-WE, 2 = previous score, 3 = 10% lower than previous score) written on index cards. The experimenter shuffled and had the student select one card with the deck turned down. After the student completed the CBM, the experimenter revealed the mystery goal. The experimenter would then count the TWW and provide the student with reinforcement (candy) if they met their goal. Candy was selected as the reinforcement option since this was a reward all participants reported as a preference. Candy was only offered as a prize option for participants during the CBM-WE reinforcement.

**Fluency Intervention.** Following data collection, writing fluency intervention sessions began by presenting the model sentences to the student (the revised sentences from each participant's previous writing probe). The experimenter explained to the student that they will be copying their revised work. The researcher told the student how many words they needed to copy in one minute in order to earn a reward. For the first session, this goal was based on the average baseline TWW from the writing probes. For example, if a student wrote an average of 20 words in three minutes, their first goal was to write at least 7 words in one minute. The researcher timed the writing for one minute and recorded how many words the participant completed in one minute. They were told to stop writing once the minute ends. Next the experimenter corrected and explained any mistakes the student made. For instance, if the student misspelled a word, the experimenter circled the word, wrote the correct spelling above, and explained that the word was not spelled correctly. The total number of correctly written words was scored and used to generate the next goal, which was an increase of one word. Then the student was directed to re-write the sample a second time. The same process of timing and scoring was repeated for the second and third trial. During the third trial, the student's goal was decided by averaging the first and second score of WSC, where the student needed to surpass the mean of the first two trials' scores. The participant earned one point on each of the three trials if they reached the goal for that trial. Participants were allowed to trade points in for prize(s) from the reward menu. The average of the WSC across the three trials within a session was the starting goal of the next session.

The length of writing samples was adjusted each session based on the participants' progress on the intervention. If previous writing samples written by participants did not meet the word count, the experimenter created appropriate (i.e., on topic, approximately same writing

level) sentences to add to the model sample. The samples were about 50% longer than their highest TWW for each preceding session.

**Planning.** During the first session of the planning phase, the experimenter provided modeling and instruction to the participant demonstrating how to use the graphic organizer for planning. This involved presenting a prompt to the participant, then demonstrating creating details for the beginning, middle, and end of a story. The details listed included the use of transition words (i.e., first, next, finally) at the start of each section (beginning, middle, end) and were in the form of either complete sentences or comprehensive phrases. The model details were brief and provided a clear indication of a part of a story (i.e., “Then the boy played with his dog”; “They played fetch in the backyard”). The experimenter read all the details aloud upon completion to demonstrate how they formed a story. The participant was then given a new prompt and instructed to create as many details (maximum 15) as they can think of in 1 minute. At the end of the minute, the experimenter provided feedback and helped the participant correct details and/or create details in written form that made sense according to the prompt.

The following sessions began by administering a CBM-WE, along with CBM-WE reinforcement, followed by the planning intervention. The intervention included presenting the participants with a story starter and asking them to work on completing the graphic organizer for 1 minute. A goal was set based on the participant’s number of details written during the instructional session. The goal equaled one additional detail. The experimenter then counted the details written and provided the participant with a point if their goal is reached. Correct details included comprehensible phrases, which the experimenter will determine upon reading. Responses will not be penalized based on spelling or grammar. They only needed to make sense as a sentence or phrase indicating a detail within a story; however, the experimenter corrected

spelling mistakes if they were made by circling the word misspelled and rewriting the correct spelling above the misspelled word. When incorrect responses were emitted, the experimenter corrected the detail and explained the reasoning to the student. Next, the experimenter gave the student a new goal of double their previous score. For instance, if the participant wrote five details during the first trial, then they would be given the goal of ten details.

A new graphic organizer, with the same story starter, was given to the participants and they were timed for two minutes. The same process of scoring was implemented for the second trial. If the participant met their goal during the second trial, they earned two additional points (three points possible in total for both trials). Participants were able to trade in their points for prizes from their reward menu at the end of the session. In cases where participants wrote the maximum number of details, their goal remained at 15 details for each of the sessions and trials unless they begin decreasing. Otherwise, the goal for each session equaled the average of the three scores during the previous session.

**Maintenance.** After the planning phase, students received CBMs in written expression to examine any changes in writing fluency. These were delivered once a week two weeks after ending the intervention.

### **Treatment Integrity**

Checklists were created for observers to monitor treatment integrity during the fluency and planning phase. This included a list of steps the experimenter must complete each session. During the fluency phase, the observer recorded whether the experimenter completed all necessary steps of the instruction, including timing, correcting mistakes, providing a goal for the student before every instance of timed writing, and rewarding the participant at appropriate times. During the planning phase, the observer recorded whether the experimenter completed all

steps of the intervention, including modeling and explanation of the graphic organizer (instructional session), timing, correction, providing a goal at the start of each timed writing, and rewarding the participants with points at the correct times. Treatment integrity was 100% and was collected for approximately 31% of the sessions.

## **Experiment 2 – Planning Intervention First**

### **Participants, Setting and Eligibility Criteria**

Four third grade students, two male and two females, were recruited to participate in the study from a local elementary school. Participants in Experiment 2 were identified, recruited, and screened using the procedures described in Experiment 1.

### **Materials**

Experiment 2 used the same materials used in Experiment 1.

### **Response Definitions, Data Collection Procedures, Inter-rater Reliability and Inter-Observer Agreement**

The variables measured and the procedures used for data collection are identical to those described in Experiment 1. Inter-scorer agreement for writing fluency measures was obtained for 39% of probes. Inter-scorer agreement was 99.56% for TWW, 99.68% for WSC, and 99.68% for %WSC. Inter-scorer agreement for qualitative writing quality was 91.11% and was obtained for 36% of probes.

### **Experimental Design**

A multiple baseline across participants design with four phases, Baseline, Planning Intervention, Fluency Intervention, and Maintenance, was used. The design procedures are the same as Experiment 1; except that the Planning Intervention phase occurred prior to the Fluency Intervention phase in Experiment 2.

## **Treatment Integrity**

Treatment integrity was scored using identical measures described in Experiment 1.

Treatment integrity was 100% and was collected for 32% of session

## **RESULTS**

### **Experiment 1 Results**

Timmy's data reflect a small increase in TWW during the fluency phase of intervention without a positive trend. This slight increase remained stable during the planning and maintenance phases. Timmy's %WSC did not show a response to the fluency or planning intervention. His qualitative writing score was consistently higher during the planning phase; however, the scores did not increase significantly above the highest point in his baseline.

Matt's data reflect a moderate increase in TWW during the fluency phase, however there is a positive trend during the previous three baseline sessions confounding these results. His TWW scores remained above baseline during the planning phase but did not show an increase after planning was introduced. During maintenance, Matt's TWW returned close to scores during baseline. Matt's data do not demonstrate a change in %WSC in response to the fluency or planning intervention. Matt's scores of qualitative writing were variable across all phases and do not show a clear response to the introduction of the fluency or planning intervention.

Leslie's data demonstrate a small to moderate increase in TWW in response to the fluency intervention. Her TWW scores remained above baseline during the planning and maintenance phases, although an additional clear increase in response to the planning phase was not shown. Leslie's scores on %WSC did not reflect an increase in response to the fluency of planning intervention; however, her scores were consistently higher and less variable during the planning phase. Leslie's data show an initial small increase in the qualitative writing score during the fluency intervention, followed by a downward trend. Her qualitative writing scores were variable during the planning phase.

Nicole's data indicate a small to moderate increase in TWW in response to the planning intervention. Her scores do not reflect an increase in TWW during the fluency phase. Nicole's TWW scores remained above baseline levels during the maintenance phase. Nicole's data also indicate a small increase in %WSC during the planning phase, yet do not show a clear increase in %WSC above baseline during the fluency phase. Her scores indicate she maintained this increase after ending intervention. Nicole's data reflect a slight upward trend in qualitative writing score during the fluency phase, followed by a moderate increase during the planning phase. Nicole maintained this increase in the qualitative writing score.

The data for Matt, Leslie, and Nicole do not reflect a clear change in ORF in response to the fluency or planning intervention, as their scores remained consistent across phases. Timmy's ORF increased during the fluency and planning phase, followed by a further increase during the maintenance phase.



Each Experiment 1 participants' data are presented below. Figure 1 contains graphs depicting the total number of words (TWW) written during the CBM-WE probes given at the start of each session.

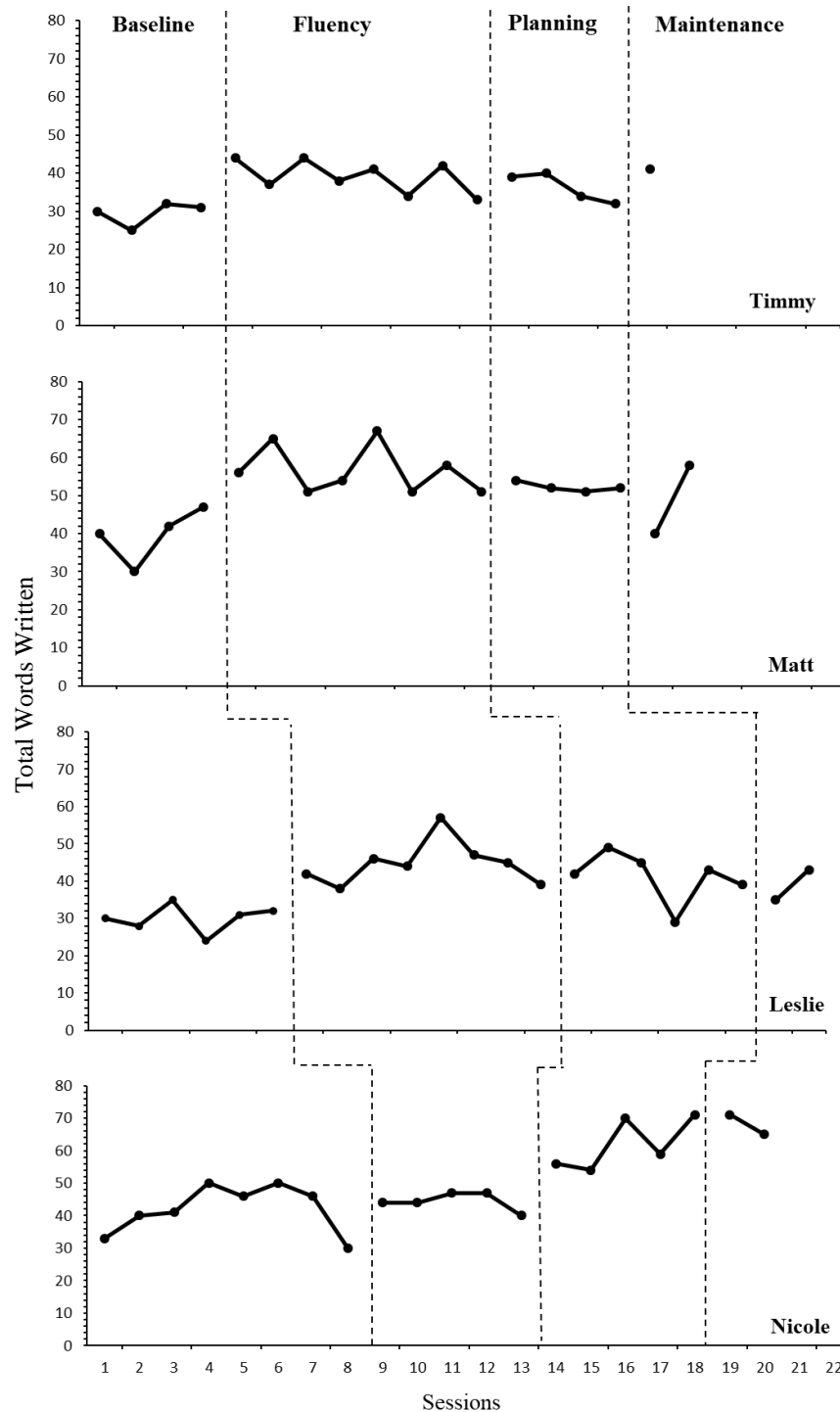


Figure 1. Total Words Written by each participant on the curriculum-based measure in written expression each session

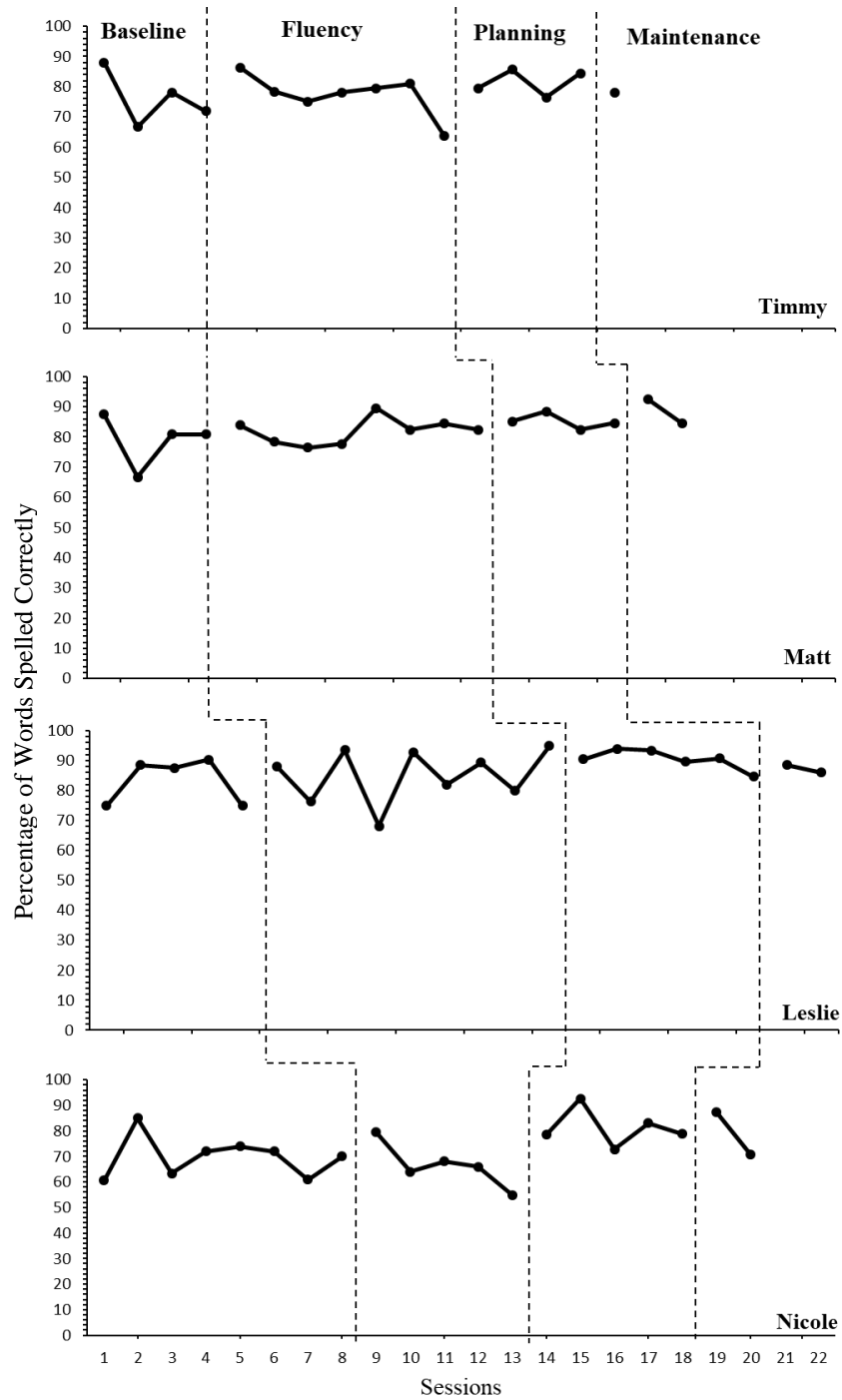


Figure 2. Percentage of Words Spelled Correctly on curriculum-based measure of written expression during each session.

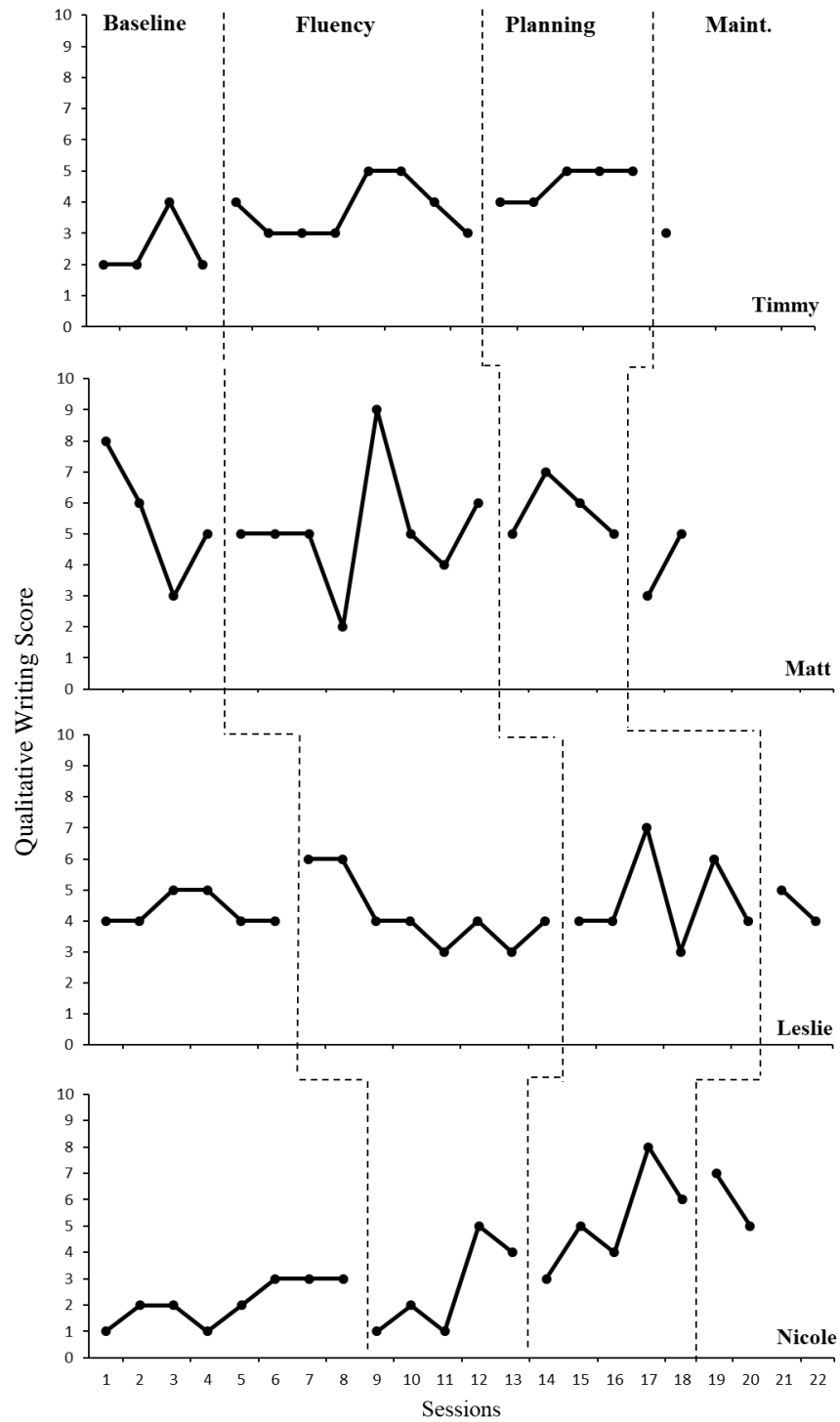


Figure 3. Qualitative Writing Scores for each Experiment 1 participant each session.

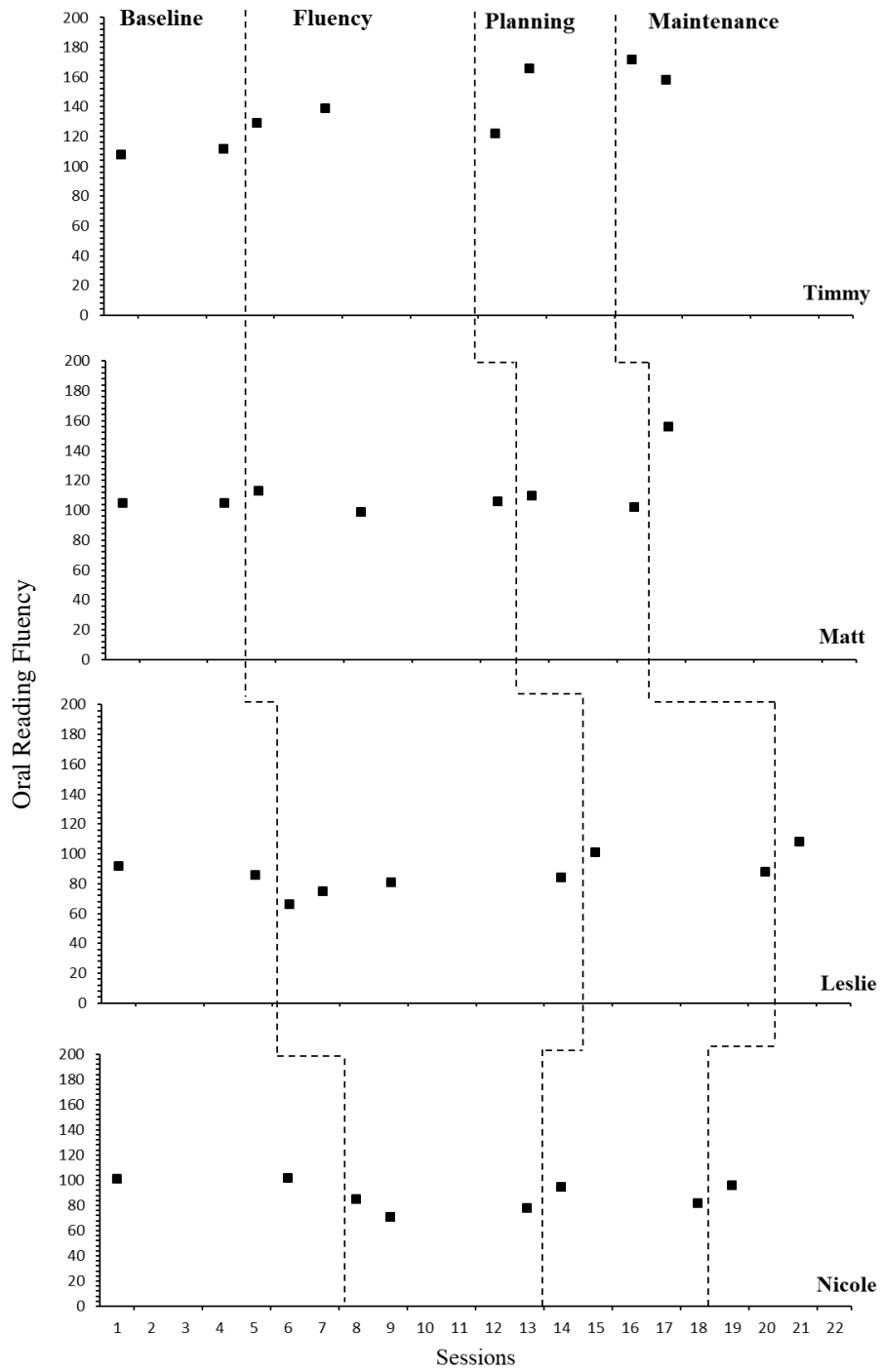


Figure 4. Oral Reading Fluency scores for each participant across sessions.

## **Experiment 2 Results**

Lily's data reflect a small increase in TWW in response to the planning intervention. Her data did not demonstrate a further increase during the fluency phase. Her TWW scores during the maintenance probes slightly decreased. Her %WSC remained stable across all phases near the functional ceiling. Lily's qualitative writing score did not appear to change meaningfully in response to the planning or fluency intervention.

Zack's data during the planning phase were highly variable. Although most data points during planning did not overlap with baseline levels his responding varied substantially through this phase. He did not experience an increase in TWW during the fluency phase. During baseline, Zack's %WSC reflected a negative trend. During the planning phase, his %WSC demonstrated a positive trend, reaching scores higher than baseline for two sessions. During the fluency phase, Zack's %WSC initially decreased to scores similar to the end of his baseline, followed by a similar upward trend shown during the planning phase. Maintenance probes indicated Zack maintained a small increase on TWW and %WSC compared to baseline. Zack's data reflect variable scores of qualitative writing across all phases. His scores during the fluency phase were somewhat less variable and consistently higher. His qualitative writing scores decreased during the maintenance phase.

Sophie's data demonstrate a small increase in TWW in response to the planning intervention. This increase in TWW was maintained across the fluency and maintenance phases. Data does not indicate an effect of either intervention on %WSC, as her scores on this measure remained high and near ceiling values across all sessions. Sophie's data does not reflect a meaningful change in her qualitative writing scores in response to either intervention.

Geoff's TWW scores did not increase from baseline during the planning intervention phase. His data reflect a small increase in TWW during the fluency phase. Geoff's scores of %WSC did not differ meaningfully from baseline during the planning or fluency phase; however, during the maintenance phase, his data demonstrated a small increase. Compared to baseline scores, Geoff's data did not reflect an increase in qualitative writing scores in response to either intervention.

The data for Zack, Sophie, and Geoff do not indicate a change in ORF in response to either the planning or fluency intervention. Their scores remained generally consistent across all phases. Lily's data indicate a slight increase in ORF occurred during the fluency phase, in addition to a further increase in ORF when probed for maintenance.

Each Experiment 2 participants' data are presented below. Figure 5 contains graphs depicting the total number of words (TWW) written during the CBM-WE probes given at the start of each session.

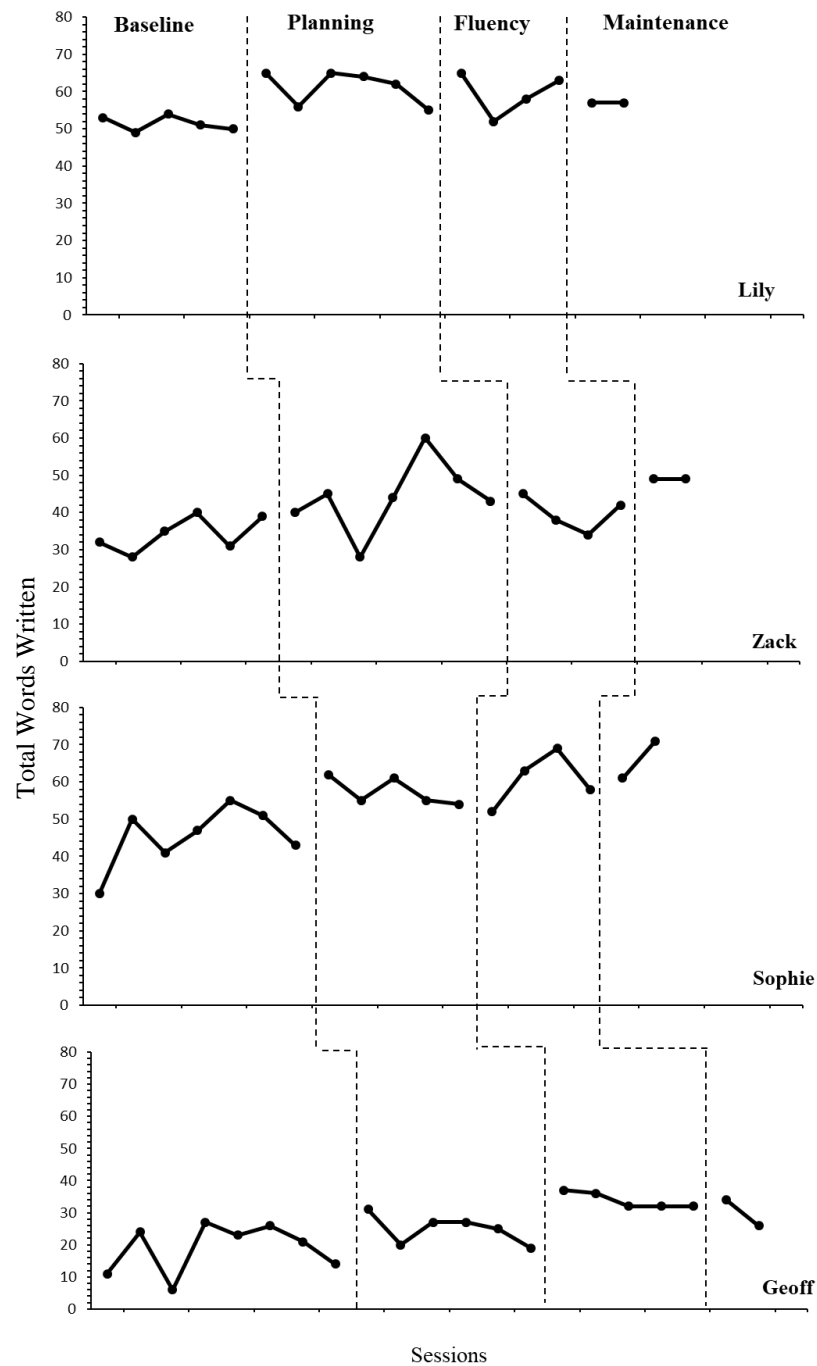


Figure 5. Total Words Written by each participant on the curriculum-based measure in written expression each session.

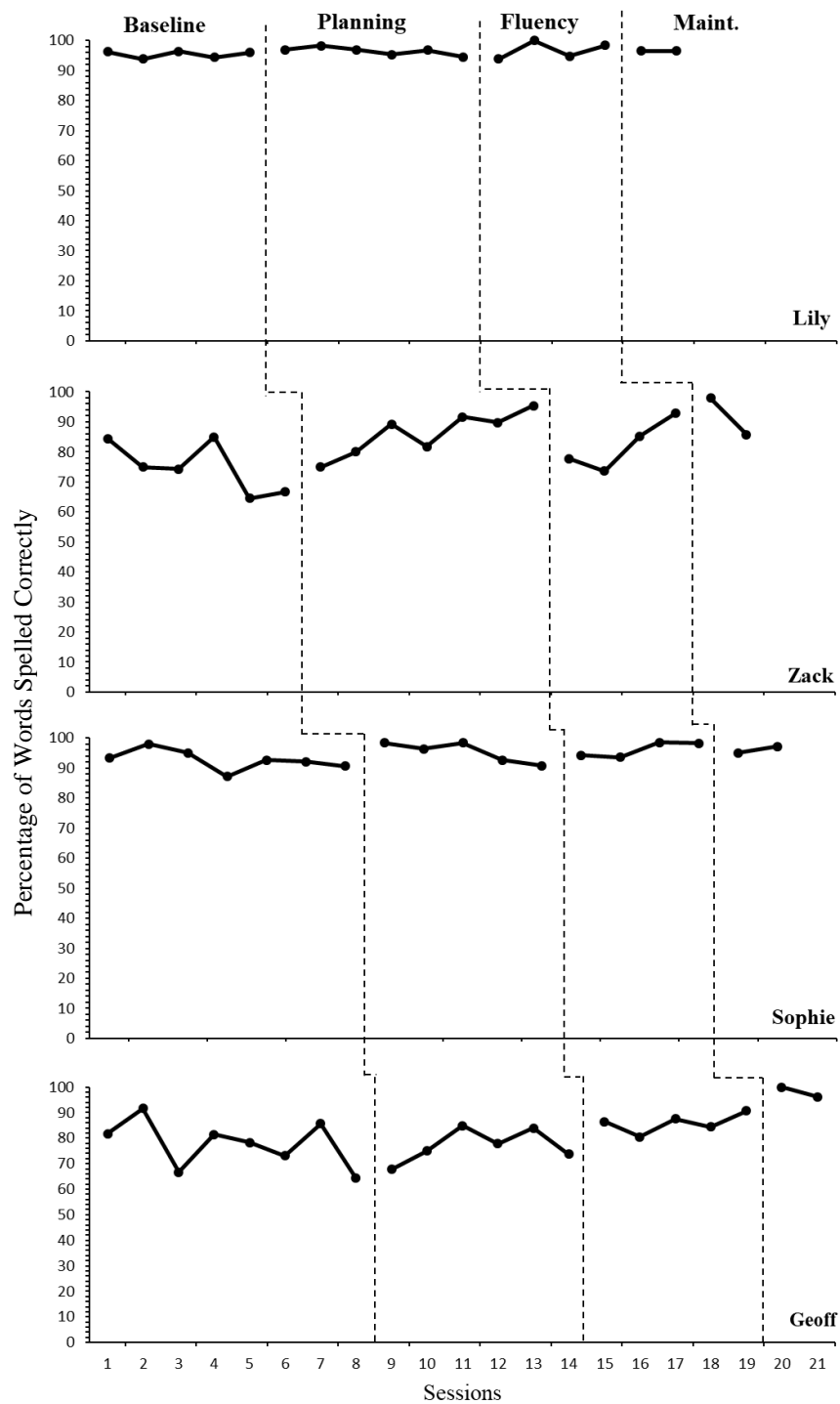


Figure 6. Percentage of Words Spelled Correctly on curriculum-based measure of written expression during each session.



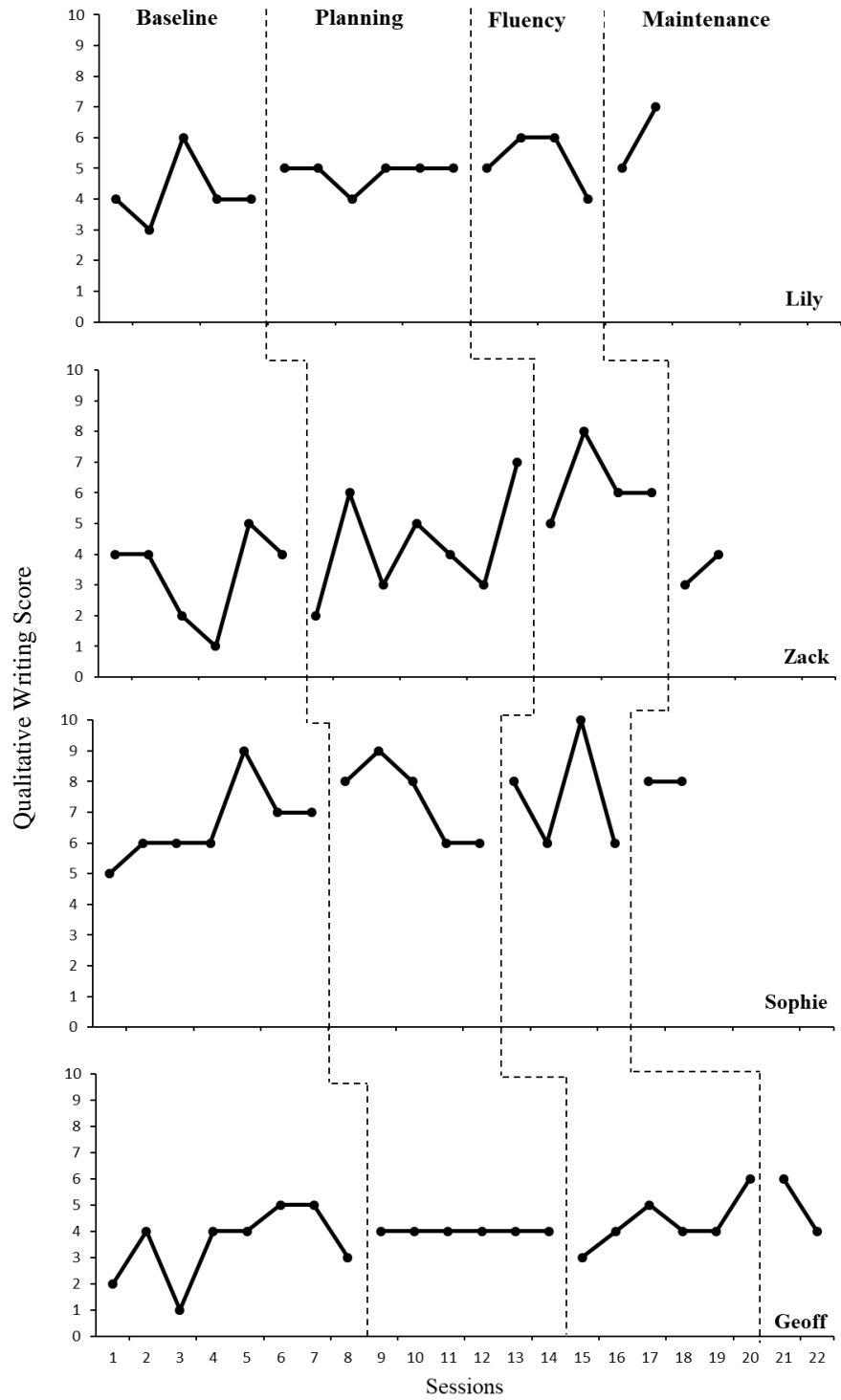


Figure 7. Qualitative Writing Scores for each Experiment 2 participant each session.

Figure 8 contains graphs displaying the oral reading fluency (ORF) scores of each participant across sessions.

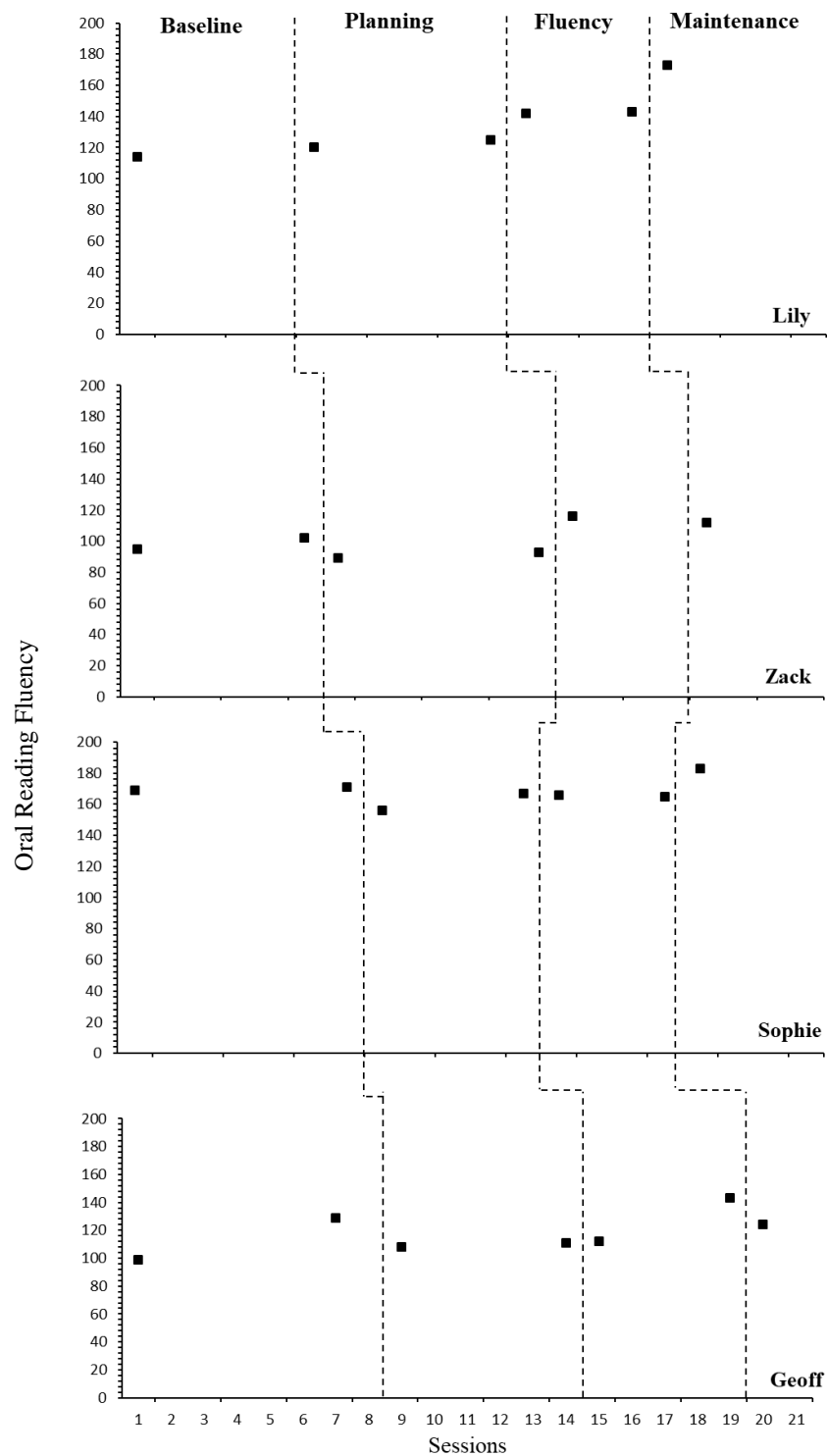


Figure 8. Oral Reading Fluency scores for each participant across sessions.

# **DISCUSSION**

## **Experiment 1 Discussion**

The results of Experiment 1 offer some support of the effectiveness of the fluency intervention, utilizing repeated writing practice. While the data indicates small effects in writing fluency during the fluency phase on the experiment, these increases were not large or consistent enough to promote confidence in this intervention. Additional progress in writing fluency after ending the fluency intervention and introducing the planning intervention was evident for one participant. This study extends the literature on writing interventions explicitly targeting writing fluency skills. Previous research demonstrated performance feedback methods improve writing skills (Truckenmiller et al., 2014). Performance feedback can be applied in a variety of methods. This experiment used performance feedback procedures in both interventions delivered to participants; however, the repeated writing intervention utilized performance feedback to a larger degree. Past research has shown performance feedback to be effective for increasing writing speed (Hier & Eckert, 2016). Less support exists for writing intervention using performance feedback methods for improving writing accuracy, as measured by production independent indices such as %WSC (Alitto et al. 2016). This study's data support the existing literature, as the results indicated a stronger improvement in writing speed, compared to accuracy.

Gains in writing fluency were represented by an increase in TWW during the fluency phase, where the repeated writing intervention was delivered, for three participants. Improvements for the three participants who exhibited increased TWW were modest. Results differed for Nicole, as she did not demonstrate a response to the repeated writing intervention but improved in both writing speed and accuracy during the planning phase. This may have been in part due to her greater difficulty with writing accuracy and writing quality during baseline,

compared to the other participants. Rehearsal and correction using a graphic organizer to plan a narrative may have helped Nicole's writing fluency skills by allowing her to better formulate and organize her ideas. It is unclear whether the repeated writing intervention prior to the planning intervention aided in her growth in writing fluency, as her data did not demonstrate an improvement in those skills measured during the fluency phase.

Experiment 1 did not demonstrate a clear pattern of improvement in qualitative writing quality in response to the repeated writing or planning intervention. This may be due to the nature of the writing prompt used to measure progress. The participants' writing progress was measured with the Story Composition rubric (Appendix A) by examining their performance on the CBMs in written expression, which is a timed task. While this type of assessment appropriately measures writing fluency, it may not be the strongest measure for examining other components of writing quality. For instance, an incomplete story was often scored for participants. Although the rubric used to measure qualitative writing quality attempted to measure components less affected by incomplete stories or narratives, perhaps if the participants were given more time for writing their organization, writing style, or plot development may have been scored higher. Also, being a timed task, participants were not able to revise their work within the timeframe.

Another explanation for the lack of growth in qualitative writing quality is that the interventions themselves did not target the skills necessary for overall improvement in this area. Organization skills were partially targeted during the planning intervention; however, other components such as vocabulary, character development, and sentence structure were not explicitly addressed. Additionally, the interventions implemented may not have created a large enough growth in fluency to also result in writing quality improvement.

Although the literature supports the connections between reading and writing skills (Graham & Hebert, 2011), a pattern of improvement in oral reading fluency (ORF) was not found in response to the writing interventions or writing fluency growth. It is possible the gains made in writing speed by participants were not large enough, or sustained long enough, to result in a growth in ORF. Alternatively, these results may suggest that the skills of reading and writing fluency are distinct repertoires under differing stimulus control and therefore require different interventions to result in improvement.

Future research may benefit from additional examination of writing interventions using repeated writing practice with performance feedback procedures. Studies may benefit from using strategies that include more of an emphasis on correction of spelling and/or mechanics errors rather than speed, which may result in stronger improvement in accuracy measures of writing. Additionally, future research may choose to select participants for writing fluency interventions that present greater difficulties with spelling or writing accuracy in comparison to the participants to this experiment. Future studies may also benefit from examining writing quality, in response to writing fluency targeted interventions, with a variety of measures, including timed and untimed (or longer timed) tasks.

### **Experiment 2 Discussion**

Experiment 2 delivered the same interventions used in Experiment 1; however, the planning intervention, which involved timed practice with a graphic organizer, was introduced to participants first. Experiment 2 results found that three participants (Lily, Zack, and Sophie) made small improvements in writing fluency (TWW) when given the planning intervention. In all three cases the magnitude of improvement was small. Zach specifically demonstrated small yet variable growth. Additional growth was not found when participants were delivered the

fluency intervention. Additionally, one participant experienced a small increase in writing speed only when introduced to the fluency intervention. A clear superiority for one intervention on increasing writing fluency was not shown. When comparing Experiment 2 results to Experiment 1 results, the order or implementation did not result in an obvious answer for which order would result in the highest skill increase. To the extent that clear results were obtained, it appears that participants benefited from one intervention or the other, but not both. This suggests that there may be an issue of matching instructional approach to student needs.

Three participants, Lily, Sophie, and Zack, made marginal gains in TWW during the planning phase of Experiment 2. Considering the small growth shown and the lack of improvement among the other participant, the timed practice with the graphic organizer did not consistently or strongly produce improvement in writing fluency when first introduced. Although graphic organizers have been shown to aid in improvement of writing fluency and quality, through the use of story-mapping (Li, 2007), the method of instruction used in this study may not have involved the practice needed to result in more significant improvement. For instance, the participants were instructed to produce ideas using a graphic organizer during the intervention; however, they were not instructed to then write a story using the ideas they planned. Participants writing fluency and/or writing quality may have increased more from practice applying their rehearsal with a graphic organizer to a composition. When administered the CBM in written expression, participants were not directed to plan ideas beforehand using the method taught with the graphic organizer during intervention. Only one participant, Lily, was noted to have used this method of planning during the CBM administration.

Furthermore, the method of performance feedback delivered during the planning intervention may connect to the lack of improvement seen among participants in writing quality.

The experimenters provided feedback relating to logical story formation and spelling errors during the planning intervention. Although rehearsing idea formation in the manner of sequence of events targets organization skills, considering the multiple components which contribute to writing quality, additional feedback and correction on factors relating to the content (i.e., emotions characters experience) may have resulted in improvement in writing quality.

Additionally, Experiment 2 may offer insight into which skills are most beneficial to target first when aiming to increase writing fluency. Although three participants demonstrated marginal gains in TWW when first introduced to the planning intervention, one participant, Geoff, did not present improvement in TWW until introduced to the fluency phase. Geoff's baseline TWW was lower compared to the other participants in Experiment 2, suggesting he may have required practice with writing speed, without the added component of idea formation, as his initial method of intervention. Considering that students who struggle with writing tend to direct the majority of their attention toward creating content rather than planning, revising or editing their composition (Graham & Harris, 2005), the results suggest difficulty with quickly and /or accurately forming words and sentences may prevent students from being able to effectively utilize planning skills explicitly taught to them.

Future research should improve and expand upon the interventions utilized in the present study. First, future studies may choose to instruct participants to practice quickly creating ideas using a graphic organizer, followed by directing them to create a narrative using their produced ideas. Further performance feedback on the composition created using their graphic organizer would likely be effective for improving writing fluency and quality. Additionally, various types of graphic organizers targeting different variables may be examined for their effect on increasing writing speed, accuracy, and quality.

## GENERAL DISCUSSION

The results of these experiments extend the literature in several central ways. Experiment 1 and 2 each expand the literature on writing interventions designed to explicitly increase writing fluency abilities. Using a multiple baseline design, the two experiments compared the bearing of the order in which interventions targeting different skills that may pertain to writing fluency, such as planning, mechanics, or speed, are implemented. The experiments examined the impact of the writing interventions on the writing production, measured by TWW, and accuracy, measured by %WSC, of four elementary school students in each design. Both studies also evaluated the effectiveness of the interventions on participants' qualitative writing quality and oral reading fluency.

Experiment 1 examined the effect of first introducing a repeated writing intervention, modeled after repeated reading instruction, on production dependent and independent writing indices. The repeated writing intervention utilized a modeling component, which involved participants copying portions of their correctly revised compositions. Participants in Experiment 1 received the repeated writing intervention during the fluency phase of the study for three to four weeks before being introduced to the planning intervention, which utilized timed practice with a graphic organizer. Although participants achieved only marginal to moderate growth in writing production (TWW), results from Experiment 1 replicates research on the effectiveness of interventions using performance feedback methods on increasing writing speed (Alitto et al, 2016; Koenig, Eckert & Hier, 2016).

One participant's (Nicole) data did not follow the same pattern of marginal increase during the fluency phase, followed by a maintenance of this growth during the planning phase as demonstrated by the other participants. This demonstrates there may be individual differences in



the degree to which specific writing intervention methods prove effective, and at what time. Considering this participant made small improvements in both writing accuracy (%WSC) and speed (TWW) during the planning phase, the results indicate she benefited more from rehearsal of creating and organizing ideas for a narrative rather than quickly copying correct model sentences of a story. Nicole's increased performance of qualitative writing quality during the planning phase, although preceded by a positive trend during the fluency phase, also suggests the planning intervention may have benefited other aspects of her writing beyond fluency. Compared to the other participants in Experiment 1, Nicole's baseline writing quality was lower. This may provide insight into which individuals would benefit from practice with graphic organizers, or planning skills in general, as an initial approach to improving writing fluency and quality. Instruction of self-regulatory skills pertaining to writing (planning, editing, revising), especially when combined with transcription instruction, has been shown to improve overall writing competency (Graham & Harris, 2000). Individuals behind in writing fluency who demonstrate noticeable deficits in higher-order writing skills may need to receive instruction that either initially targets skills such as planning, or simultaneously addresses both basic and higher-order writing skills.

Experiment 2 examined the impact of initially delivering a planning intervention, involving repeated timed practice with a graphic organizer, to four elementary school students. Marginal improvement in writing speed (TWW) for three participants during the planning phase supports existing literature on the effectiveness of graphic organizers for increasing writing production (Regan et al., 2016; Li, 2007); however, the current results yielded smaller and less consistent growth in writing quality than those studies. One participant (Geoff), did not demonstrate a growth in TWW until introduced to the repeated writing intervention in the

fluency phase. Considering he began with a lower baseline level of TWW compared to the other Experiment 2 participants may offer understanding into why some individuals may benefit more, in terms of writing fluency growth, from repeated practice of writing quickly and accurately.

The present studies also extend the literature on the relationship between reading and writing. Although existing literature has shown a positive connection between growth in reading in writing (Jouhar & Rupley, 2020), an increase in oral reading fluency (ORF) was not found among participants that experienced an increase in writing fluency. Although one participant (Lily) in Experiment 1 demonstrated a marginal increase in ORF during the fluency phase on intervention, her writing fluency did not grow simultaneously. Due to this increase being small, in addition to the lack of growth in ORF among other participants, the results of the present studies do not provide further evidence of a connection between oral reading fluency and writing fluency growth. Existing literature has demonstrated a positive relationship between word and sentence reading fluency abilities and compositional writing quality and fluency for students in first to sixth grade (Kent et al., 2013; Abbot & Berninger, 1993). Researchers theorize the relationships seen between reading and writing abilities may be contributed to factors including knowledge of text and phonological awareness (Fitzgerald & Shanahan 2000; Kent et al., 2013). Although evidence exists of a relationship between reading and writing fluency skills, the results of the present studies suggest that this relationship may not be bidirectional. The increased knowledge of text, in addition to other factors, that is produced through increased reading fluency may directly aid in writing production; however, learning to write more quickly may not necessarily target the skills required for reading fluency growth.

The current studies also examined the relationship between reading and writing, concerning their similarity of development, by examining the impact of a writing fluency

intervention modeled after a successful reading fluency intervention. A vast amount of research supports the effectiveness of repeated reading instruction on reading fluency skills (Therrien, 2004). The present studies demonstrate some evidence that the two skills bear some similarity in their acquisition of fluency; however, the lack of substantial growth in both writing speed and accuracy suggest reading and writing may also have important differences regarding their development of fluency. Although research has shown that both areas require adequate fluency before developing more advanced skills (Nuemann & Dickinson, 2001), it may be true that reading and writing differ in their process of fluency development.

Furthermore, it is possible the effort made to modify the repeated reading intervention did not provide the forms of opportunities for practice that would have created a more substantial growth in writing fluency. For instance, participants only received feedback on about two sentences at a time during the repeated writing intervention. Previous research has demonstrated larger increases in writing fluency in response to performance feedback procedures that involved providing feedback to at least a full paragraph (Hier & Eckert, 2016; Truckenmiller et al., 2014). Additionally, participants made few errors while copying sentences, which resulted in a limited amount of error correction. Although participants copied their revised work, which was independently created, the time between their independent production and writing the revisions may not have been short enough to impact their writing accuracy. Considering these factors, although small to moderate gains in writing speed was found among several participants, the repeated writing intervention may not have provided enough opportunities for error and correction to result in increases in accuracy.

The present experiments also extend the literature on modeling methods used in writing instruction. The method of modeling used in the repeated writing intervention involved

participants copying their corrected compositions. Existing research indicates modeling aids self-regulation in writing, which may improve the accuracy and quality of writing (Schunk & Zimmerman, 2007); however, the current studies did not find consistent improvement in these areas in response to the repeated writing intervention. Although marginal improvement was demonstrated in writing speed, it is possible the modeling strategy used did not engage the participants enough to benefit their other writing skills. A modeling component that allowed participants to watch the sentences be written out, rather than simply copying them, might have proved more beneficial for participants' writing fluency and quality.

Lastly, the current experiments contribute to the literature on writing instruction by offering insight into the effectiveness of initially targeting foundational skills versus higher-order writing skills. The results of Experiment 1 demonstrated marginal to moderate success for three participants in terms of writing speed, when initially targeting the skills of speed and accuracy. Three participants in Experiment 2 experienced small gains in writing speed during the planning intervention they were firstly introduced, supporting the existing literature that targeting higher order skills, such as planning, can improve basic writing skills (Harris, Graham & Mason, 2006). However, in both experiments at least one participant did not demonstrate an improvement in writing skills when introduced to their first method of intervention, indicating individual differences may impact what method of instruction is beneficial. Research has demonstrated that literacy interventions, specifically in the area of reading, are most effective when they are matched to students' individual needs and areas of deficit, such as decoding skills or fluency rate (Jones et al., 2016). Considering the evidence that different literacy interventions provide different outcomes for individuals based on their specific skills, future research may benefit from

examining the extent to which various writing interventions are successful according to individuals' areas of need in writing.

### **Limitations**

There are several limitations of the present studies. First, in both experiments participants only received writing intervention approximately twice per week. Considering the connection between intensity of academic intervention implementation and its effectiveness on individuals (Fuchs & Fuchs, 2007), the results of the current studies should be interpreted considering the limited frequency of intervention delivery. Additionally, the participants continued to receive typical writing instruction in the classroom daily. Thus, future research may benefit from examining the effects of the intervention used in these studies when delivered at a higher frequency.

A second limitation for both studies is the limited instruction on the use of a graphic organizer. Each participant received one session of instruction with the graphic organizer, which involved modeling and practice. Although this provided participants with the knowledge required to complete the directions of the planning intervention, participants may have benefited from viewing additional model examples of a graphic organizer used for a story. This would have better ensured all participants had a strong understanding of how to accurately use the planning tool. Future studies may choose to provide more extensive instruction involving modeling with graphic organizers before directing participants to practice with them on their own.

Finally, future research should replicate the findings of the current studies with a larger sample. This would provide evidence that the results obtained in these studies would apply to a broader population. Larger studies may reveal individual differences that impact growth in

writing fluency and response to different forms of intervention. The current studies suggest the effects of writing interventions may vary across individuals; therefore, future research would benefit from further examination of the variables impacting individuals' response to various forms of writing instruction.

### **Conclusion**

In summary, Experiment 1 examined the impact of two different writing interventions on elementary school students' writing fluency, writing quality, and oral reading fluency abilities. The intervention administered during the first phase of the multiple baseline experiment was a repeated writing intervention. The intervention was modeled after repeated reading instruction and used performance feedback procedures, along with a modeling component. The intervention delivered during the second phase was a planning intervention which utilized timed practice with a graphic organizer. The results of Experiment 1 indicated small to moderate gains in writing speed were achieved in response to the repeated writing intervention for three participants; however, additional improvement did not occur during the planning phase. Experiment 2 extended upon Experiment 1 by comparing the impact of the same interventions, yet when delivered in opposite order. The results of Experiment 2 indicated that small increases in writing speed occurred for three participants when delivered the planning intervention. Further improvement in writing fluency was not shown for these participants in response to the repeated writing instruction. Future research can expand upon these studies by further examining the impact of the interventions with extended session time, higher frequency of intervention delivery, different methods of modeling used in the repeated writing intervention, and additional modeling of graphic organizers during instruction. Additionally, future research could examine

possible individual differences in instructional needs to help determine the types of academic instruction certain individuals may benefit from the most.

## APPENDIX A. STORY COMPOSITION RUBRIC

### Story Composition Rubric

	Score
1. Story beginning 0 = abrupt, weak 1 = serviceable, somewhat interesting 2 = grabbing, exceptionally engaging	<div></div>
2. Story sequence 0 = a series of random, disjointed, or rambling statements 1 = has some sequence 2 = moves smoothly and coherently from start to finish	<div></div>
3. Plot (storyline) 0 = uninteresting, dull, flat 1 = interesting, logical, acceptable 2 = intriguing, well-crafted	<div></div>
4. Characters show feeling/emotions 0 = no 1 = some mild or subtle emotion (upset, smiling, laughing, excited, happy) 2 = strong emotion evident in at least one character (anger, love, terror)	<div></div>
5. Writing style is 0 = immature, dull, undistinguished 1 = serviceable, matter-of-fact 2 = artful, stylish, exceptional	<div></div>
Total:	<div></div>



## APPENDIX B. GRAPHIC ORGANIZER

### Story Planner

#### Beginning

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#### Middle

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#### End

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## APPENDIX C. INSTITUTIONAL REVIEW BOARD APPROVAL

### ACTION ON EXEMPTION APPROVAL REQUEST



To: Katherine Moore  
Psychology

From: Dennis Landin  
Chair, Institutional Review Board

Date: July 30, 2019

Re: IRB# E11780

Title: Effects of Planning and Repeated Writing Interventions on Writing Fluency

Institutional Review Board  
Dr. Dennis Landin, Chair  
130 David Boyd Hall  
Baton Rouge, LA 70803  
P: 225.578.8692  
F: 225.578.5983  
[irb@lsu.edu](mailto:irb@lsu.edu)  
[lsu.edu/research](http://lsu.edu/research)

New Protocol/Modification/Continuation: New Protocol

Review Date: 7/30/2019

Approved X Disapproved \_\_\_\_\_

Approval Date: 7/30/2019 Approval Expiration Date: 7/29/2022

Exemption Category/Paragraph: 1

Signed Consent Waived?: No

Re-review frequency: (three years unless otherwise stated)

LSU Proposal Number (if applicable):

By: Dennis Landin, Chairman 

#### PRINCIPAL INVESTIGATOR: PLEASE READ THE FOLLOWING – Continuing approval is CONDITIONAL on:

1. Adherence to the approved protocol, familiarity with, and adherence to the ethical standards of the Belmont Report, and LSU's Assurance of Compliance with DHHS regulations for the protection of human subjects\*
2. Prior approval of a change in protocol, including revision of the consent documents or an increase in the number of subjects over that approved.
3. Obtaining renewed approval (or submittal of a termination report), prior to the approval expiration date, upon request by the IRB office (irrespective of when the project actually begins); notification of project termination.
4. Retention of documentation of informed consent and study records for at least 3 years after the study ends.
5. Continuing attention to the physical and psychological well-being and informed consent of the individual participants, including notification of new information that might affect consent.
6. A prompt report to the IRB of any adverse event affecting a participant potentially arising from the study.
7. Notification of the IRB of a serious compliance failure.
8. **SPECIAL NOTE: When emailing more than one recipient, make sure you use bcc. Approvals will automatically be closed by the IRB on the expiration date unless the PI requests a continuation.**

\* All investigators and support staff have access to copies of the Belmont Report, LSU's Assurance with DHHS, DHHS (45 CFR 46) and FDA regulations governing use of human subjects, and other relevant documents in print in this office or on our World Wide Web site at <http://www.lsu.edu/irb>

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## **VITA**

Katherine Lea Moore, born in Asheville, North Carolina, received her bachelor's in science degree in Psychology from University of Florida in Gainesville, Florida in 2015. She continued her studies at Louisiana State University under the supervision of Dr. George Noell, earning her a Master of Arts degree in Psychology in 2019. She is currently completing a doctoral psychology internship at Virginia Beach City Public Schools and plans to graduate with a Doctor of Philosophy degree in School Psychology in August of 2021.