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Effects of a Repeated Writing Intervention on Writing Fluency and Writing Quality

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EFFECTS OF A REPEATED WRITING INTERVENTION ON WRITING FLUENCY AND
WRITING QUALITY

A Thesis

Submitted to the Graduate Faculty of
Louisiana State University and
Agricultural and Mechanical College
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requirements for the degree of
Master of Arts

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Abstract

Writing is a fundamental skill that is essential for students' academic success. In fact, students with writing difficulties are shown to have lower academic achievement and reduced likelihood of college acceptance (Graham & Perin, 2007). Writing fluency is a crucial component in the development of writing abilities, as it allows for the development of higher-order writing skills (Bloom, 1986, Binder, Haughton & Bateman, 2002). Limited research exists of interventions targeted specially for writing fluency; however, performance feedback procedures have been shown as effective (Hier & Eckert, 2016). Literature suggests the skills of reading and writing share similar processes of learning (Nueman & Dickinson, 2001). The current study examines the impact of a writing intervention structured after the repeated reading intervention, incorporating a modeling component, on the writing fluency of elementary school students.

INTRODUCTION

The ability to write serves not only as powerful tool for communication, but also an essential method to learn. Writing functions as a medium for gathering, retaining, and conveying information (Graham, MacArthur, & Fitzgerald, 2007). McHale and Cermak (1992) reported students spend approximately 30-60% of their time at school writing on paper; however, with the growing use of computers, keyboards, and other systems of technology, this time on task has likely decreased. Nonetheless, despite the progressively digital world we live in, handwriting remains a central form of graphic communication in schools. Evidence of the impact of handwriting on the development of foundational literacy skills helps explain the importance of its continued instruction (Berninger et al., 2009). The Common Core State Standards (CCSS) emphasize writing instruction in schools, and requires students to master specific writing skills at each grade level. Although writing remains a principal component of schoolwork, substantial gaps in some students' writing achievement currently exist in schools.

Writing assessment results from the National Assessment of Educational Progress (2012) reveal that over 70% of students lack proficiency in writing by eighth and twelfth grade. Problems with writing are associated with lower academic achievement, greater risk of dropping out, and decreased chances of college acceptance (Graham & Perin, 2007). A meta-analysis on the influence of writing on learning, found writing about content material improved students' performance in multiple school subjects, including mathematics, social studies, science, and language arts—further demonstrating a connection between writing abilities and overall academic performance (Bangert-Drowns, Hurley, & Wilkinson, 2004). In view of the impact of writing abilities on learning and academic success, it is critical to develop efficient interventions to improve the skills of students with writing difficulties. Addressing writing skills during

elementary grade levels may help decrease the present gap in proficiency, as evidence increasingly shows greater success in addressing literacy problems early on, rather than intervening during later years (Slavin, Madden, & Karweit, 1989).

Since writing consists of multiple components, the challenge often lies in deciding which areas to target during instruction (National Commission on Writing, 2003). Writing quality variables commonly addressed include spelling, vocabulary, syntax, and story structure or organization (Shanahan & Lomax, 1986). Current research on writing interventions for elementary and secondary grade levels reveal the effectiveness of interventions, mainly strategy-based instruction, designed to improve writing quality (Graham et al., 2012; Graham & Perin, 2007). Among the various factors influencing the quality of writing, students must develop writing fluency to successfully demonstrate writing skills, endure long periods of writing, and apply writing skills to more complex assignments (Binder, 1996). Additional knowledge about how to increase writing fluency may prove beneficial to educators seeking methods designed to address writing difficulties early on. This study aims to examine the outcomes of a writing fluency intervention for early elementary school students, applying the same structure of instruction that has been found to be successful for increasing oral reading fluency.

The term “fluency” typically denotes mastery of a skill (Binder, 1996). It is not difficult to understand the advantages of speaking a language fluently, or of the ability to read without hesitation; relatedly, writing fluency holds equal importance in the context of expanding knowledge and communication. Scholars widely define writing fluency as the ability to write with speed and accuracy (National Commission on Writing, 2003). Evidence suggests developing writing fluency enables students to devote greater attention to higher order activities, such as creativity and application, by requiring less attention to the foundational skills of writing

(Bloom, 1986, Binder, Haughton & Bateman, 2002). Students who struggle with writing tend to focus their attention on creating content, rather than planning, evaluating, or revising their work (Graham & Harris, 2005). Struggling to form words and sentences without hesitancy and/or frequent mistakes, prevents students from engaging in the skills necessary to produce more complex and effective narratives. Considering the impact of writing fluency on the students' development of higher order skills, difficulties with writing fluency early on presumably contribute to falling behind academically.

Accordingly, educators and researchers recognize the importance of developing effective methods of instruction geared toward improving students' writing skills (Graham et al., 2012; Rogers & Graham, 2008). Theory and research propose competent writers can communicate effectively in various styles of writing; therefore, developing a model of instruction needs to take into consideration the skills required across all types of narrative (National Assessment of Educational Progress, 2002). For instance, writing a persuasive piece may demand skills of analysis and evaluation, whereas writing a story often requires creativity. A meta-analysis of writing interventions for elementary school students found explicit instruction most effective for improving writing quality across all measured components (Graham et al., 2012). Explicit instruction generally involves teaching a skill through levels of scaffolding, guiding the student with clear instructions, and providing feedback until they reach the desired level of performance (Ness, 2011). Studies indicate adding self-regulation to strategy instruction serves as an effective explicit teaching method for improving writing quality in elementary, middle, and high school grade levels (Graham et al., 2012; Graham & Perin, 2007). Strategy instruction entails explicitly training students on methods for planning, revising, and editing text (Graham & Perin, 2007). Self-regulated strategy development (SRSD) teaches these same strategies, along with self-

regulation skills, such as self-talk and self-instruction (Koster, Bouwer, & van der Bergh, 2017). Studies on the effectiveness of SRSD commonly included the measurement of multiple skills (e.g., organization, ideation, vocabulary) using various rubrics (Graham & Perin, 2007). The measurement of such higher-order skills, rather than fluency measures, suggests these explicit methods of writing instruction improve writing quality, yet may not prove as useful for increasing fluency or other foundational writing skills.

Few evidence-based interventions explicitly target writing fluency; however, performance feedback is one method that has been found to be effective for improving the writing speed of elementary school students (Hier & Eckert, 2016). Performance feedback procedures consistently yield moderate to large outcomes in writing improvement (Truckenmiller et al., 2014; Eckert, 2009). For instance, a recent study found significant improvement in writing speed, measured using Production Dependent Indices (i.e., TWW, CWS, and WSC) for both peer and adult facilitated goal setting and performance feedback procedures for fourth and fifth grade students—though accuracy measures did not significantly improve in either condition (Alitto et al., 2016). While some studies suggest goal-setting enhances the success of performance feedback on improving writing fluency, additional research conversely found no significant difference in fluency when goal-setting was combined with feedback—results indicated performance feedback alone improves writing fluency of elementary school students when assessment is based on measures of production (i.e., TWW, CWS) (Koenig, Eckert & Hier, 2016). Although a growth in the total number of correct words sequences (CWS) could denote an increase in accuracy, evidence of the correlation between the two measures implies an increase in correct words may simply arise due to an increase in the number of total words written (TWW) (Alitto et al., 2016; Truckenmiller, et al. 2016). Production Independent

Indices (e.g., %CWS, %WSC) provide a clearer indication of the change in accuracy (Alitto et al., 2016). Inclusion of measures on the percentage of correct and incorrect word sequences reveal if a student increases their number of CWS and TWW, yet shows no significant change in the proportion of accuracy.

While evidence supports the use of performance feedback procedures for improving students' rate of writing, research also reveals areas where it has not been effective. For instance, research has not demonstrated long-term maintenance of performance feedback's effects or in developing generalization of the skills (Hier & Eckert, 2016). Generalized writing fluency skills allows students to maintain improvements in writing, and apply their skills to a variety of settings (Hier and Eckert, 2016; Baer, et al. 1968). Haring and Eaton's (1978) hierarchy of skill development defines the four phases of learning as acquisition, fluency, generalization, and adaptation—in which fluency entails speed and accuracy of an ability. According to this model of building skills, students need to obtain adequate precision and speed in writing before generalizing their abilities, whereas current writing fluency interventions using performance feedback primarily improve speed. Evidence also indicates a students' initial level of writing performance fails to predict their rate of writing fluency improvement when receiving a performance feedback writing intervention. A recent study found students below proficiency did not progress in writing fluency (measured by TWW) at a significantly different rate than students who were proficient (Truckenmiller, et al., 2016). Performance feedback procedures for writing fluency typically involve feedback on Production Dependent Indices, specifically TWW, which do not provide feedback on punctuation, grammar, spelling or other aspects of writing related to accuracy (Alitto, et al. 2016; Truckenmiller, et al., 2016). Students below proficiency in writing may require interventions targeting accuracy of writing in order increase their writing fluency at

a faster rate than research presently shows. Considering the current literature on effective interventions targeting fluency, writing interventions empirically proven to improve production independent indices, in addition to measures of writing speed, may provide further support in increasing students' writing skill.

Although performance feedback currently remains the most empirically validated intervention aimed at improving writing fluency, other methods of writing instruction have been shown to improve components of fluency. Sentence combining instruction has been found to be successful for increasing word count, along with writing quality for elementary school students (Saddler, 2005). This method of instruction requires students create sentences through the combination of two or more basic model sentences, which practices the development of complex sentence structure (Graham et al., 2012). While sentence combination instruction improves total word count and targets sentence complexity and sophistication, it lacks specific focus on improving overall writing fluency. Similarly, story-mapping has been shown to increase the speed of writing, along with richness of content, in students with learning disabilities in narrative writing; however, accuracy was not measured or targeted in the intervention (Li, 2007). Although research provides evidence of interventions that increase the writing production aspect of writing fluency, an additional intervention for beginning writers that increases both speed and accuracy may be useful. Improving writing fluency could speed up students' development of other writing quality measures, along with overall academic performance.

When developing or expanding upon writing interventions, considering the relationship between reading and writing may aid in deciding which components to target, and by what methods. According to James Squire's (1983) model of learning to read and write, both activities demand similar processes. For instance, readers may prepare for comprehension by recalling

prior knowledge of the topic being read, as a writer may collect past knowledge when planning a narrative (Heller, 1999). Reading and writing also share similarities in their steps of developing proficiency. For example, readers must first move past identifying single words in order to comprehend full sentences and passages; similarly, writers learn to form individual words and letters before creating meaningful narratives (Nueman & Dickinson, 2001). Unsurprisingly, rates of comorbidity have ranged from 30-75% of students with a learning disability in reading and written language, further illustrating the connections between reading and writing abilities (Graham, & Hebert, 2011). Evidence also reveals reading instruction can improve student's writing abilities, and vice versa (Graham, & Hebert, 2011). Additionally, reading and writing instruction often incorporate similar models of instruction, as procedures of explicit comprehension instruction have proven to be the most effective for improving both reading and writing abilities (Pearson & Dole, 1987).

Regarding explicit methods of reading instruction, multiple studies found the repeated reading method of instruction effective for improving reading fluency (Therrien, 2004). Repeated reading instruction typically includes (1) selecting a passage of certain length (e.g. 100-200 words), (2) having the student read the passage aloud (4) providing assistance and correction while student reads aloud, and (5) repeating the process several times or until a designated amount of time runs out. This method also often includes a modeling component, where the teacher or peer tutor reads the passage aloud, prior to the student reading (Therrien, 2004). Although research attempting to isolate the importance of modeling in repeated reading's efficacy is limited, evidence suggests modeling aids in the development of self-regulation and self-efficacy skills pertaining to reading and writing (Schunk & Zimmerman, 2007).

The value of the repeated readings intervention is highlighted by the fact that oral reading fluency is an indicator of reading competence (Fuchs, et al. 2001). Evidence indicates increasing oral reading fluency significantly improves reading comprehension (Therrien, 2004). The use of repeated reading can also be attributed in part, by its effectiveness for increasing reading fluency in both typical learners and children with learning disabilities (Freeland, Skinner, Jackson, et al., 2000). Overall, the empirical support of repeated reading demonstrates its success across multiple demographics and consistently yields significant results.

In view of the ample evidence for the success of repeated reading instruction for improving reading fluency, along with the relatively limited research on effective writing interventions, adapting this teaching method to writing is worth attempting. Considering the common factors between reading and writing development, it is possible the same structure for improving reading fluency can be applied to writing fluency interventions. A writing intervention based on the repeated reading template of instruction, along with a modeling component, may increase students' writing fluency. In addition, as increasing reading fluency improves comprehension, a similarly designed writing fluency intervention may improve other components of writing.

The present study will examine whether a writing fluency intervention using modeling and repeated writing practice improves the writing fluency of early elementary school students. Few studies have specifically targeted writing fluency. Additionally, current research on writing fluency instruction offers limited evidence of the interventions' success with increasing accuracy measures of writing. This study will also evaluate the changes in other measures of writing quality in students receiving the intervention. This information will help ascertain the success

and potential uses of a writing fluency intervention based on the repeated reading model of instruction.

METHOD

Participants and Setting

Students in second to fourth grade were recruited from a local elementary school for this study. Sessions took place in empty classrooms at the school. Two second grade students, Kyle and Josh, and three fourth grade students, Hallie, Betsy, and Brian, participated in the study. Students were informed that participation was voluntary and provided written assent. Parental consent was obtained for each student.

Pre-Treatment Assessment

Eligibility criteria. Students were given a CBM-Written Expression measure to assess total words written and words spelled correctly. Based on norms for total words written for each grade level during the Fall, the study required students score below the 50th percentile of TWW for their respective grade level (Malecki & Jewell, 2003). Students were also required to meet a minimum of 10 TWW to be included in the experiment. Additionally, students received a letter-copying screening to prevent the inclusion of participants with illegible handwriting. The screening required the students to copy each uppercase and lowercase letter of the alphabet. Each letter was scored correct if it was recognizable. This excluded potential participants who need instruction in letter writing.

Student Interview. The experimenter interviewed each participant about their perceptions of writing and school. The researcher also asked the participants about their interests and hobbies. This information was used to adapt the intervention materials to each participant, with the goal of making the writing intervention more enjoyable for the students. This consisted of selecting grade level reading probes related to preferred topics and interests of the participants.

Materials

The experimenter used CBMs in written expression, which consisted of a story starter and three minutes of timed writing. Students were supplied with writing materials to complete the CBMs. Oral reading fluency (ORF) CBMs were also administered.

Writing samples for the intervention were created for each participant based on his or her grade level and interests. The model writing samples consisted of several sentences from a grade level reading passage, usually relating to a topic of interest to the student. 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).

Participants received rewards (e.g., snack, toy, preferred activity) contingent upon meeting his or her goal during each intervention session. A reward menu listed the possible rewards to be traded in for points earned during the intervention. Rewards were determined by asking the participants what types of things they will be interested in working for, and creating a personalized list for each participant. Each menu contained five options (e.g., pencil, one minute coloring, one minute with yo-yo, sticker, piece of candy) with each prize costing one token. Participants had the opportunity to earn up to three tokens each session, and were allowed to trade them in for any combination of rewards.

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

The experimenter administered a CBM-Written Expression probe at the start of each session. The probe was used to measure the primary dependent variable, writing fluency, based on total words written (TWW), words spelled correctly (WSC) and percentage of words spelled correctly (%WSC). TWW was calculated by counting the total number of legible words

written by the student, including incorrectly spelled words. WSC was scored by circling any incorrectly spelled words, using minimal judgment considering appropriateness of context, and subtracting the number of incorrectly spelled words from the TWW. The %WSC was scored by dividing the total WSC by the TWW. Writing probes were scored according to procedures outlined in Powell-Smith and Shinns, 2004.

Inter-scorer agreement (ISA) was calculated to ensure accuracy of scoring. Scorers were trained on the scoring process of CBM-WE probes. ISA was obtained for all indices (TWW, WSC, %WSC) for approximately 36% of the probes. 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 will be multiplied by 100 to calculate ISA. Inter-scorer agreement was above 99% for each measure of writing fluency.

The probes were also scored for writing quality. This was scored using a qualitative features checklist for the CBM-WE (Powell-Smith & Shinns, 2004, see appendix A). The checklist examined qualities of communication, including logical and effective story organization, in addition to features of mechanics, such as grammar, sentence structure, vocabulary, and punctuation. The checklist required raters to score each component of a scale of one to four. Agreement was scored by dividing the smaller score by the higher score and converting into a percentage. Inter-rater reliability was calculated for 27% of the probes. Inter-scorer agreement for writing quality was approximately 91% for the study.

Experimental Design

This study used a multiple baseline across subjects design. Writing probes were delivered during baseline and at the start of each session of writing instruction.

Baseline. Baseline sessions consisted of data collection without intervention. Each student was encouraged to try their best, and provided with praise after completing each CBM. The researcher did not deliver any feedback on the students' writing performance.

Intervention. The writing fluency intervention began with presenting the model sentences to the student. The researcher then 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 instance, if a student wrote an average of 30 words in three minutes, their first goal was to write more than 10 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 is over. 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 to the student that the word was misspelled. The total number of correctly written words was calculated by subtracting the number of incorrectly copied words from the total number of words written. This number was used to create a new goal for the second time copying the sample. The experimenter made the new goal slightly higher than their previous WSC. The new goal reflected a 10% increase in TWW or at least 1 additional word, whichever was greater. Then the student was instructed to re-write the sample a second time. The same process of timing and scoring was repeated. The participant earned another point if they reached the goal on this trial.

Next, the researcher gave the student a new goal to reach. This was decided by averaging the first and second score of WSC, where the student would need to beat the average of the two. The student was timed for one minute as they copied the writing sample a third time. After

correcting any mistakes, the researcher scored the TWW and WSC and praised the student for working. If the student reached his or her goal, they received a point and were allowed to trade points in for a prize(s) from the reward menu. The average of the three WSC was used to create the starting goal of the next session.

The length of writing samples was adjusted each session according to the participants' progress on the intervention. The samples were approximately 50% longer than their highest TWW for each previous session.

Maintenance. After the intervention phase, students received CBMs in written expression to assess any changes in writing fluency. These were delivered three to four weeks after ending the intervention and delivered three times over the course of one to two weeks.

Treatment Integrity

A checklist was created for observers to monitor treatment integrity. This included a list of steps the experimenter must complete each session. The observer recorded if 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. Treatment integrity was collected for approximately 28% of the sessions. The treatment integrity for the study was 100%.

RESULTS

Writing fluency scores are presented for all five participants in Figures 1 and 2. Additionally, writing fluency phase means are presented in Table 1. Writing accuracy scores, measured by %WSC, did not change meaningfully from baseline during treatment or maintenance for any of the participants in the study. Regarding writing speed, measured by TWW, marginal initial gains were seen for Josh, Hallie, and Betsy; however, the scores did not continue to increase substantially above baseline. Josh's graph notes a modification made during treatment, which consisted of increasing the 1-minute writing practice by 30 seconds. This change was made to allow the participant enough time to copy at least one full sentence, since his writing speed during practice was not rapid enough to complete this task at only 1 minute. Josh scored slightly higher on the TWW index once the adjustment was implemented. The graph of Hallie's scores displays a regression after winter break, which occurred in the middle of treatment, followed by a steady increase in TWW once she returned to treatment. One participant, Kyle, made a small increase in TWW at the start of treatment, yet decreased below his baseline level as treatment continued. Besides an initial treatment probe which fell below baseline, Brian scored consistently and marginally above his average baseline score throughout treatment. Also, Brian's first treatment probe may not accurately depict the effect of treatment at that point due to a week of sickness between the intervention session and the writing probe following it.

During the maintenance phase, Josh and Kyle returned to scoring close to their baseline TWW. Josh decreased in writing speed after the intervention ended, and Kyle increased to the level of his original writing speed. Hallie, Betsy, and Brian each maintained approximately the

same TWW score or higher during maintenance as they earned toward the end of their treatment phase.

Table 1.
Writing Fluency Phase Means

Student	Baseline			Treatment			Maintenance		
	TWW	WSC	%WSC	TWW	WSC	%WSC	TWW	WSC	%WSC
Josh	20.75	13.50	63.01	26.76	19.00	70.32	22.67	17.33	75.59
Kyle	30.00	29.28	97.54	27.36	27.27	95.38	32.67	21.33	95.89
Hallie	21.54	17.69	82.32	24.50	20.80	85.15	30.67	28.33	92.50
Betsy	29.86	29.07	97.26	41.33	40.17	97.16	38.33	38.00	99.38
Brian	24.67	23.33	94.74	31.80	32.20	94.62	43.33	42.67	98.46

Note. TWW = total words written; WSC = words spelled correctly; %WSC = percentage of words spelled correctly

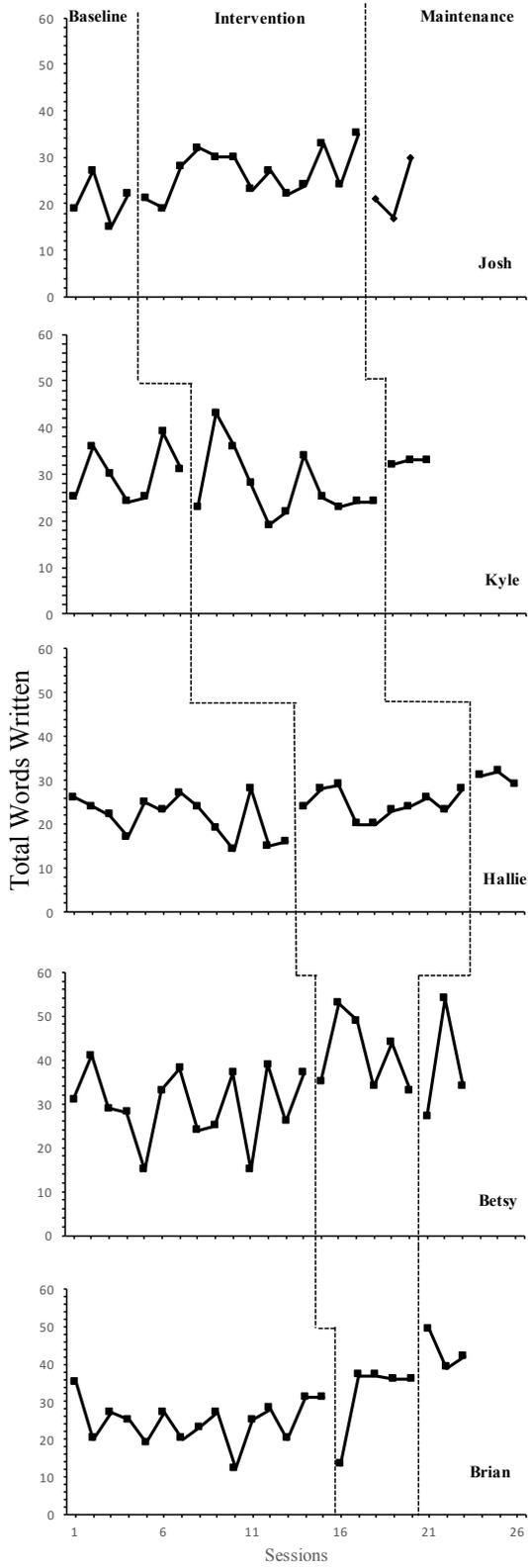


Figure 1. Total Words Written across sessions for Josh, Kyle, Hallie, Betsy, and Brian.

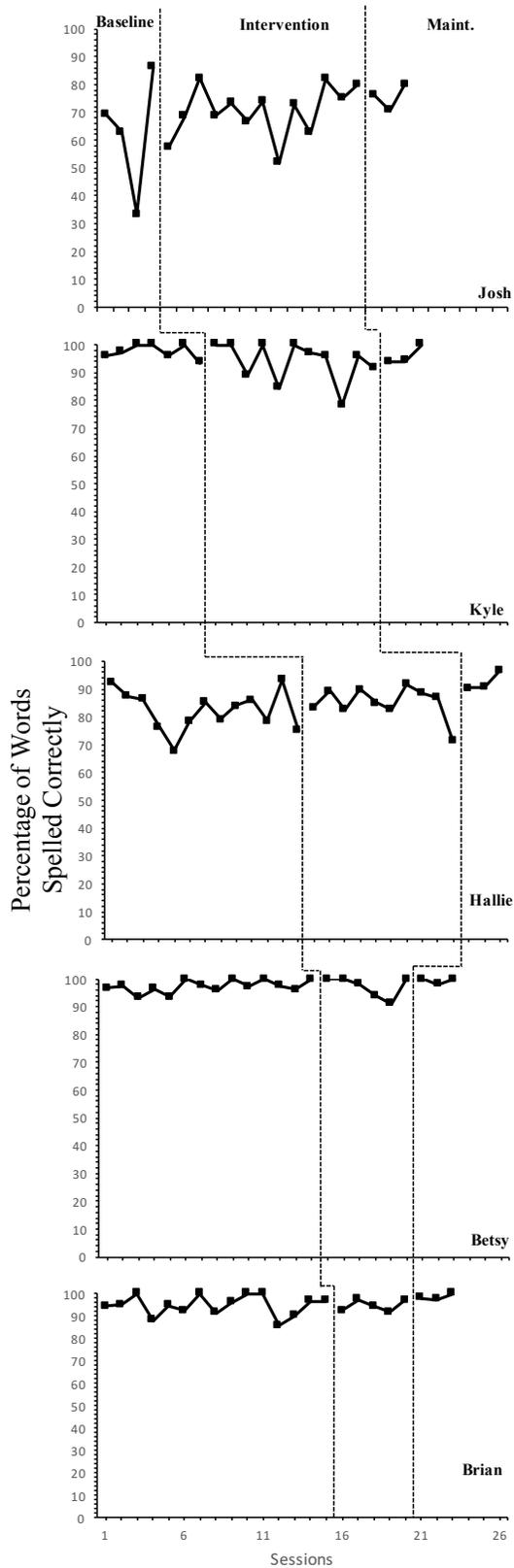


Figure 2. Percentage of Words Spelled Correctly across sessions for Josh, Kyle, Hallie, Betsy, and Brian.

Writing quality phase means are presented in Table 2. Writing quality remained at approximately the same level during treatment as compared to baseline for all five participants.

Table 2.
Qualitative Writing Quality Phase Means

Student	Baseline	Treatment	Maintenance
Josh	13.5	13.15	13.67
Kyle	18.14	20.27	19.33
Hallie	12.00	15.00	15.33
Betsy	18.43	18.83	17.33
Brian	15.40	15.40	17.33

DISCUSSION

This study investigated the impact of a repeated writing intervention with a modeling component on the writing fluency and qualitative writing quality of five elementary school participants. A multiple baseline design was used to examine the effects of the intervention on writing production, measured by TWW and WSC, and accuracy, measured by %WSC. Results reveal a marginal increase in the production component of fluency, specifically TWW, for three out of the five participants. Examination of the phase means further demonstrates small increases in writing speed in response to the intervention for four of the participants. Phase means of the participants' writing quality do not suggest substantial improvement in writing quality for any of the students. Although one participant, Hallie, improved in writing quality during treatment, a closer examination shows an upward trend in writing quality since the start of baseline, invalidating the suggestion of an effect of treatment on this component. Although data demonstrates some small gains in fluency, the results do not provide strong evidence for the effectiveness of the intervention used. Visual analysis does not illustrate a clear effect of the repeated writing intervention, as none of the participants' intervention phases was consistently above baseline levels. However, examination of the writing fluency scores across phase means, in comparison with typical growth in fluency measures for students at the participants' grade level, indicates that their growth during the time of intervention was faster than average. When comparing the scores to writing fluency norms, four out of the five participants increased their average weekly growth of TWW at a rate at least twice as fast as the typical average increase in TWW per week (Tadatada, 2011). It is also important to consider that the students continued to receive typical writing instruction in the classroom during the time of the intervention, which likely contributed to their small increases in fluency.

Although only marginal increases in writing fluency were evident in this study, the data replicates research on the effectiveness of interventions incorporating performance feedback on writing fluency, specifically writing production (Alitto, et al. 2016; Hier & Eckert, 2016; Koenig, Eckert & Hier, 2016). This study also replicated research conducted by Hier and Eckert (2014), which found that performance feedback may produce short term improvement in writing fluency, but does not necessarily ensure the maintenance of fluency improvements. The current effects were smaller and less consistent than those in prior studies. The experiment replicated the existing literature on writing fluency interventions, in that substantial improvement in writing accuracy was not demonstrated (Alitto, et al. 2016; Truckenmiller, et al., 2016). In addition to extending the literature on interventions specifically designed for improving writing fluency, the study further examined the relationship of reading and writing, regarding their similarity in fluency development. Ample research provides evidence for the success of repeated reading on improving reading fluency (Therrien, 2004). The lack of substantial improvement in writing fluency in response to an intervention modeled after the repeated reading intervention suggests that there may be important differences between reading and writing in regard to the acquisition of fluency. While research indicates reading and writing both require adequate fluency before moving on to higher level skills (Nueman & Dickinson, 2001), perhaps the development of fluency itself may not proceed in consistent ways across tasks . It may also be true that the attempt to adapt the repeated reading intervention to writing did not provide the types of opportunities for practice that may be more effective for increasing writing fluency if designed differently. For instance, the design, which consisted of the 3-minute intervention, may not have provided the participants with enough time to practice writing correct sentences to a point that automaticity began to emerge . Additionally, it may be that substantial writing improvement

requires the exercise of creativity and independent formation of sentences in order to increase fluency and quality. This component of writing does not exist for reading, and ought to be considered when comparing acquisition of fluency for each skill.

Considering the evidence indicating success of performance feedback on writing fluency, in addition to other components of writing, (Truckenmiller et al., 2014; Hier & Eckert, 2016; Eckert, 2009), the style of feedback given to participants during the intervention should also be examined. Rather than providing performance feedback to an independently produced passage of at least a paragraph length, as prior research typically includes, feedback was given to no more than two sentences at a time. Minimal errors occurred, most likely since the sentences were directly copied from the model. Perhaps this type of performance feedback, although similar in structure to repeated readings, did not provide enough opportunities for error and correction in order to substantially improve writing fluency over the course of the intervention.

The method used for modeling correct sentences should also be evaluated when examining the results of this study. While past studies have shown modeling to improve self-efficacy of writing skills, such as in strategy instruction (Schunk & Schwartz, 1993), limited research exists on its direct impact of writing fluency. Evidence suggests modeling benefits self-regulation in writing, which may aid in the quality and accuracy of writing (Schunk & Zimmerman, 2007); however, this study was not able to replicate those findings with this specific intervention. Perhaps the method of modeling for writing instruction requires a more active component, such as viewing the instructor write out a sentence, as this may more precisely mirror the design of modeling used in reading instruction.

Although only minimal improvement occurred in this study, it may be the case that with further procedural refinement that a more substantive benefit can be obtained. Additionally, the

results indicate that writing interventions may require more time intensive instruction or different procedural components compared to reading instruction. Future research should explore further methods for incorporating performance feedback into interventions aimed at increasing writing fluency. A writing intervention modeled after the repeated reading intervention which also incorporates a creative component to the intervention would also be useful in providing insight into the possible differences and similarities in fluency acquisition for reading and writing. Furthermore, researchers should examine how lengthened practice of repeatedly copying correct writing passages would compare in fluency gains.

The current study extended existing literature by examining the impact of a writing intervention, modeled after the repeated reading intervention, on writing fluency and quality. It was found that marginal improvement of writing production, TWW, occurred for three of the participants during treatment; however, results do not provide clear evidence to claim the intervention has a direct or strong impact on the increases in writing fluency. Additionally, the writing accuracy component of fluency, as well as writing quality, did not meaningfully increase for any of the subjects. Additional research is needed to identify effective methods for increasing students' writing fluency.

References

- Alitto, J., Malecki, C. K., Coyle, S., Santuzzi, A., (2016). Examining the effects of adult and peer mediated goal setting and feedback interventions for writing: Two studies. *Journal of School Psychology, 56*, 89-109
- Baer, D.M., Wolf, M. M, & Risley, T. R. (1968). Some current dimensions of applied behavior analysis. *Journal of Applied Behavior Analysis* R. Harris & S. Graham (Eds.). New York, NY: Guilford.
- Bangert-Drowns, R. L., Hurley, M. M., & Wilkinson, B. (2004). The effects of school-based Writing-to-Learn interventions on academic achievement: A meta-analysis. *Review of Educational Research,*
- Berninger, V. W., Abbott, R. D., Augsburger, A., & Garcia, N. (2009). Comparison of pen and keyboard transcription modes in children with and without learning disabilities. *Learning Disability Quarterly.*
- Binder, C., (1996). Behavioral fluency: Evolution of a new paradigm. *The Behavior Analyst, 19*, 163-197.
- Bloom, B. S. (1986, February). The hands and feet of genius: Automaticity. *Educational Leadership, 70-77.*
- Eckert, T. L., Coddling, R. M., Truckenmiller, A. J., & Rheinheimer, J. L. (2009). Improving children's fluency in reading, mathematics, spelling, and writing: *A review of evidence-based academic interventions*. In A. Akin-Little, S. G. Little, M. A. Bray, & T. J. Kehle (Eds.), *Handbook of behavioral interventions in the school* (pp. 111–124). Washington, DC: American Psychological Association.
- Freeland, J. T., Skinner, C. H., Jackson, B., McDaniel, C. E., & Smith, S. (2000). Measuring and increasing silent reading comprehension rates: Empirically validating a repeated reading intervention. *Psychology in the Schools*
- Fuchs, L. S., Fuchs, D., Hosp, M. K. (2001). Oral reading fluency as an indicator of reading competence: A theoretical, empirical, and historical analysis. *Scientific Studies of Reading*
- Graham, S., & Harris, K. (1997). Self-regulation and writing: Where do we go from here? *Contemporary Educational Psychology*
- Graham, S., & Hebert, M. (2011) Writing to Read: A Meta-Analysis of the Impact of Writing Instruction on Reading. *Harvard Educational Review*
- Heller, M. F (1999) Reading-Writing Connections: From Theory to Practice. Book

- Graham, S., Mckeown, D., Kiuahara, S., Harris, K. R (2012) A Meta-Analysis of Writing Instruction for Students in the Elementary Grades. *Journal of Educational Psychology*.
- Graham, S., Perin, D., (2007) A Meta-Analysis of Writing Instruction for Adolescent Students. *Journal of Educational Psychology*.
- Haring, N.G., Lovitt, T.C., Eaton, M.D., & Hansen, C.L. (1978). The fourth R: Research in the classroom. Columbus, OH: Charles E. Merrill Publishing Co
- Hier, B. O., & Eckert, T. L. (2014). Evaluating elementary-aged students' abilities to generalize and maintain fluency gains of a performance feedback writing intervention. *School Psychology Quarterly*
- Hier, B.O., Eckert, T. L., (2016) programming generality into a performance feedback writing intervention: A randomized controlled trial. *Journal of School Psychology*.
- Koenig, E. A., Eckert, T. L., & Hier, B. O. (2016). Using Performance Feedback and Goal Setting to Improve Elementary Students' Writing Fluency: A Randomized Controlled Trial. *School Psychology Review*, 45(3), 275-295.
- Li, D. (2007) Story Mapping and Its Effects on the Writing Fluency and Word Diversity of Students with Learning Disabilities. *Learning Disabilities: A Contemporary Journal*
- Malecki, C. K., & Jewell, J. (2003). Developmental, gender, and practical considerations in scoring curriculum based measurement writing probes. *Psychology in the Schools*, 40, 379-390.
- McHale, K., & Cermak, S. A. (1992). Fine motor activities in elementary school: Preliminary findings and provisional implications for children with fine motor problems. *American Journal of Occupational Therapy*, 46, 898–903.
- National Commission on Writing. (2003). The neglected “R.” College Entrance Examination Board.
- Ness, M. (2011) Explicit Reading Comprehension Instruction in Elementary Classrooms: Teacher Use of Reading Comprehension Strategies, *Journal of Research in Childhood Education*
- Neuman, S. B., Dickinson, D. K. (2001), Handbook of Early Literacy Research, Volume 1
- Pearson, P. D., & Dole, J. A. (1987). Explicit comprehension: A review of research and a new conceptualization of instruction. *Elementary School Journal*, 88, 151–165.
- Powell-Smith, K. A., & Shinn, M. R. (2004). *Administration and Scoring of Written Expression*

Curriculum-Based Measurement (WE-CBM) for Use in General Outcome Measurement. Eden Prairie, MN: Edformation Inc. Retrieved from <http://www.aimsweb.com/wp-content/uploads/written-expression-cbm-manual.pdf>

- Rogers, L. A., Graham, S. (2008). A Meta-Analysis of Single Subject Design Writing Intervention Research. *Journal of Educational Psychology*
- Saddler, B. (2005). Sentence combining: A sentence-level writing intervention. *The Reading Teacher*
- Shanahan, T., & Lomax, R. G. (1986). An Analysis and Comparison of Theoretical Models of the Reading- Writing Relationship. *Journal of Educational Psychology*
- Schunk, D. H., & Swartz, C. W. (1993). Goals and Progress Feedback: Effects on Self-Efficacy and Writing Achievement. *Contemporary Educational Psychology*
- Schunk, D. H., & Zimmerman, B. J. (2007). Influencing children's self-efficacy and self-regulation of reading and writing through modeling. *Reading and Writing Quarterly*, 23, 7-25.
- Slavin, R., Madden, N., & Karweit, N. (1989). Effective programs for students at risk: Conclusions for practice and policy. In R. E. Slavin, N. L. Karweit, & N. A. Madden (Eds.), *Effective programs for students at risk* (pp. 21–54). Boston, MA: Allyn & Bacon.
- Starlin, C. (1971). Evaluating progress toward reading proficiency. In B. Bateman (Ed.), *Learning disorders*, vol. 4: Reading. Seattle, Washington: Special Child Publications.
- Tadatada, A. (2011). *Growth rates of curriculum-based measurement-written expression at the elementary school level*. Unpublished Master's Thesis, Western Kentucky University, Bowling Green.
- Therrien, W. J. (2004). Fluency and comprehension gains as a result of repeated reading: A meta-analysis. *Remedial and Special Education*
- Wolf, M. (Ed.). (2001). *Dyslexia, fluency and the brain*. Timonium, NJ: York Press, Inc.

Appendix A. Qualitative Features of Writing Checklist

Qualitative Features of Writing Checklist

Student Name: _____

Rater: _____

Date: _____

Testing Material: _____

After having the student complete WE-CBM probes, judge the degree to which you observe these important features of successful writing. Note that some of these features may not be observed.

Communication

_____ Story communicates thoughts and ideas

_____ Story has a logical organizational structure or sequence

Mechanics

_____ Uses appropriate sentence structure

_____ Uses correct syntax

_____ Uses appropriate vocabulary accurately

_____ Observes punctuation rules

Additional Comments:

09-01-04

Scoring Rubric for Checklist

Instructions: Circle the box representing the score most appropriate for each feature.

Mechanics	1	2	3	4
Sentence Structure	Most sentences are run-on sentences or incomplete sentences.	There are a few run-on sentences or incomplete sentences.	There are one or two run-on sentences or one or two incomplete sentences.	There are no run-on sentences. All sentences are complete.
Syntax	Most sentences have grammatical errors.	There are a few grammatical errors.	There are one or two grammatical errors.	There are no grammatical errors.
Vocabulary Usage	Most words are used incorrectly.	Some words are used incorrectly.	One or two words are used incorrectly.	All words are used correctly.
Punctuation	Most sentences are punctuated incorrectly.	Some sentences are punctuated incorrectly.	One or two sentences are punctuated incorrectly.	All sentences are punctuated correctly.
Communication	1	2	3	4
Thoughts and Ideas	The writing does not clearly express any thoughts or ideas.	The writing includes one or two thoughts or ideas. There is little or no detail used to support/elaborate their ideas.	The writing presents three or more thoughts or ideas. The writer used little or no detail to elaborate. OR One or two thoughts with multiple details.	The story presents three or more thoughts or ideas. The writer used multiple details to support/elaborate on their thoughts.
Organizational Structure	There is little or no organization. Ideas seem disconnected and do not make sense.	The story is somewhat clear and focused. Some of the ideas connect to the story.	The story is mostly clear and flows logically. Most of the writing connects to the main idea of the story.	The story is clear and flows logically. All ideas relate to the story.

Appendix B. IRB Approval



ACTION ON EXEMPTION APPROVAL REQUEST

TO: Katherine Moore
Psychology

FROM: Dennis Landin
Chair, Institutional Review Board

DATE: September 22, 2017

RE: IRB# E10624

TITLE: Effects of a Repeated Writing Intervention on Writing Fluency, Writing Quality, and Oral Reading Fluency

Institutional Review Board
Dr. Dennis Landin, Chair
130 David Boyd Hall
Baton Rouge, LA 70803
P: 225.578.8892
F: 225.578.5983
irb@lsu.edu
lsu.edu/research

New Protocol/Modification/Continuation: New Protocol

Review Date: 9/21/2017

Approved Disapproved

Approval Date: 9/22/2017 Approval Expiration Date: 9/21/2020

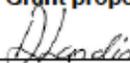
Exemption Category/Paragraph: 1

Signed Consent Waived?: No

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

LSU Proposal Number (if applicable):

Protocol Matches Scope of Work in Grant proposal: (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>

Vita

Katherine Moore graduated with a Bachelor of Science degree in psychology in 2015 from the University of Florida. Katherine is a graduate student in the school psychology doctoral program at Louisiana State University under the supervision of Dr. George H. Noell. Katherine's research interests include academic and behavioral interventions, school-based consultation, and treatment for children with developmental and intellectual disabilities.