The Effects of Self-Graphing on Oral Reading Fluency for a Student with E/BD within an Alternative Education School

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Abstract

Students with emotional and behavioral disorders (E/BD) exhibit behavioral and social challenges that affect their ability to access instruction in the classroom. Despite this, there is a paucity of research on reading interventions for students with E/BD. Recent researchers have demonstrated positive effects when pairing simple interventions to comprehensive reading programs. This study extends the literature base by building upon the tiered supports provided to a student with E/BD in a self-contained alternative education school and evaluating the effects of adding self-graphing before and self-graphing after reading multiple passages on oral reading fluency. Social validity and intrinsic motivation also were assessed with implications for practice and future directions discussed.

The Effects of Self-Graphing on Oral Reading Fluency for a Student with E/BD within an Alternative Education School

Students with emotional and behavioral disorders (E/BD) exhibit behavioral and social challenges which may impede their ability to access academic instruction in the classroom (Little, Lane, Harris, Graham, Story, & Sandmel, 2010). The behavior of students with E/BD may be characterized by disruptive outbursts, aggression, social withdrawal, inattention, or depression, all of which can be to varying degrees. These students tend to experience school failure including low test scores and grades, grade retention, and school dropout (Wagner & Cameto, 2004; Lane 2007). Also, school failure coupled with displays of inappropriate behavior may lead to decisions for the students to receive their special education services within alternative education settings. School failure often can lead to poor post-school outcomes for students with E/BD characterized by poor employment, mental health and substance abuse issues, and access to the corrections system (Jolivette, Stichter, Nelson, Scott, & Liaupsin, 2000).

In addition to displaying more chronic and intense social and behavioral problems than their typical peers, students with E/BD also may have comorbid academic deficits (Reid, Gonzalez, Nordness, Trout, & Epstein, 2004). These comorbid deficits may contribute to the negative school and post-school outcomes such as dropout (Wehby, Falk, Barton-Arwood, Lane & Cooley, 2003). The specific academic deficits students with E/BD may experience can be significant and the scope wide-ranging (Nelson, Benner, Lane, & Smith, 2004). Reading deficits

are one way students with E/BD may struggle with and related to negative school and post-school outcomes (Greenbaum, Dedrick, Friedman, Kutash, Brown, Lardierh, & Pugh, 1996). Additionally, poor reading motivation associated with a history of reading failure may moderate the effects of efficient reading interventions for students with E/BD due to the bidirectional relationship that exists between reading motivation and reading literacy (Becker, McElvany, & Kortenbruck, 2010). Therefore, effective reading interventions for struggling readers with E/BD should be acceptable and motivating to the student.

According to Harris, Oakes, Lane, and Rutherford (2009), more research with students with E/BD is warranted, particularly for supplementary reading interventions for struggling readers with or at-risk for E/BD. Further, less is known about the effects of interventions for students with E/BD within tiered models of support- response to intervention (RtI) and positive behavioral interventions and supports (PBIS) model. A combined tiered model of RtI and PBIS model for students with E/BD may provide them with both academic and behavioral prevention and intervention using data-based decisions. (Lane, Kalberg, & Menzies, Bruhn, Eisner, & Crnobori, 2011). This model may assist in the identification and implementation of a variety of interventions to improve or ameliorate both academic and behavioral problems. For students non-responsive to universal supports, Lane (2007) suggests that targeted, secondary-tier interventions be identified by following a systematic, pre-determined protocol.

Although targeted, evidence-based practices at the secondary-tier should be available for use in RTI/PBIS models, a paucity of research regarding effective and efficient secondary-tier reading interventions exists. Researchers have shown that comprehensive reading interventions using scripted reading programs in small, ability leveled groups of students with E/BD may have positive effects (Barton-Arwood, Wehby, Falk, 2005; Lingo, Slaton, & Jolivette, 2006; McDaniel, Houchins, Terry, & Gagne, 2011). Alternatively, positive effects also have been shown for interventions that are added to existing reading instruction for use as targeted, secondary-tier supports (Gunter, Miller, & Venn, 2003; Lingo, Jolivette, & Barton-Arwood, 2009; Oakes, Mathur, & Lane, 2010; Strong, Wehby, Falk, & Lane, 2004). One such intervention is self-graphing, an element of self-monitoring (Gunter, Miller, Venn, Thomas, & House, 2002). Self-monitoring incorporates metacognition strategies targeting improvement with control of focus and thought, and regulation of accuracy and pace (Nelson & Narens, 1990). When implemented, self-monitoring strategies improve reading achievement for students with disabilities (Laurice & Eveleigh, 2011). Self-monitoring strategies where students evaluate behavioral performance are effective in reducing problematic behaviors and increasing prosocial behaviors (Hughes, Copeland, Argan, Wehmeyer, Rodi, & Presley, 2002). DiGangi, Maag, and Rutherford (1991) found that the effectiveness of self-monitoring was enriched when student data were graphed by the students themselves.

The use of self-graphing with students with E/BD originated with the graphing of behavioral data such as on-task behaviors and homework completion (DiGangi et al., 1991; Trammel, Schloss, & Alper, 1994). This strategy was extended to graphing of academic data for students with E/BD by Gunter et al. (2003). In their ABAB case study, a third grade female with E/BD entered the number of words read correct from a grade level social studies text into a computer program that produced a graphic representation of reading progress. The authors suggest that the self-graphing

intervention is effective for students who are intellectually capable of learning and completing the task successfully but whose improved motivation would in turn improve performance.

In an extension of this work, Sutherland and Snyder (2007) used self-graphing of words correct per minute (WCPM) as a component of a comprehensive reading intervention for four middle school students with E/BD. Additional components included reciprocal peer tutoring and a paragraph shrinking strategy. Students in this study completed fluency curriculum based measures at their ability level once a week and entered their data point into a computer program that produced a graph of their reading progress. They found improvements in disruptive behavior, active responding during instruction, and oral reading fluency.

Types of performance feedback are associated with self-graphing procedures. Lingo et al. (2009) examined specific types of performance feedback and measured instances of appropriate behavior during reading instruction without feedback, with verbal feedback only, and with verbal and visual feedback combined, and found that combined verbal and visual feedback yielded improved appropriate behavior when feedback was given during instruction. In the seminal studies of self-graphing of WCPM data with students with E/BD, feedback was provided after the completion of the student reading aloud (Gunter et al., 2003, Sutherland & Snyder, 2009). While both of these approaches yielded positive results, it remains unclear if changing the order in which students self-graphed and received performance feedback would alter student outcomes. In addition, none of these studies used self-graphing within three-tiered models of support or with students in alternative education settings.

The purpose of this study was to investigate whether student response to self-graphing of data prior to reading or self-graphing directly after reading a passage improved oral reading fluency. The research questions were: (a) what are the effects of before and after self-graphing on words correct per minute of oral reading fluency?; (b) how does self-graphing affect intrinsic reading motivation?; and (c) how socially valid is self-graphing for both before and after phases?

Wayne: A Case Study

Setting

This study took place in a 1st through 5th grade separate, alternative education (AE) self-contained elementary school for students with E/BD in the an urban school district in the Southeast. The majority of students are African American and male students with approximately 85% qualifying for free and reduced lunch services. As with other self-contained AE schools, this school is charged with providing unique and intensive services with a goal of transitioning the students to less restrictive educational settings (Lane, Barton-Arwood, Nelson, & Wehby, 2008; Simonsen, Britton, & Young, 2010). Students are placed at this school by a team based on academic and/or behavioral failure to progress in their mainstream school settings (either in self-contained or inclusion classrooms, with or without resource support). Return to a mainstream school setting is determined by a team based on academic and/or behavioral progress.

This school recently was using a three-tiered model of support by implementing school-wide PBIS (SWPBIS) to address behavior alongside a RTI to address students' academic skills. Their school-wide PBIS were for all students and included: (a) a universal set of positively stated expectations; and (b) a reinforcement system where tickets received for prosocial behavior were translated into points as part of students' daily progress report card. (c) The school was also implementing Check, Connect, and Expect (Cheney, Lynass, Flower, Waugh, & Iwaszuk, 2010) a secondary-tier behavioral intervention for students nonresponsive to SWPBIS. *Check, Connect, and Expect* is a secondary-tier behavioral intervention that provides a dedicated coach who delivers social skills instruction, and daily check-in and check-out procedures with goal setting and daily progress reports. As a universal academic support, *Corrective Reading* (CR; Engelmann, Meyer, Carnine, Becker, Eisele, & Johnson, 1999) was implemented for students in third through fifth grade who were reading at least one grade level below their peers. *CR* is a leveled, explicit, scripted reading program with each lesson including teacher-directed instruction, independent written reading exercises, and oral reading practice. Students received daily small group instruction in ability groups formed based on their *CR* level.

Participant

Wayne was a third grade African American male who attended the self-contained school for 16 months at the start of this study. Prior to attending the self-contained school for students with E/BD, Wayne attended a mainstream school and accessed special education services with an E/BD eligibility in a self-contained classroom. Wayne was moved to the self-contained school through a placement decision based on his disruptive and potentially dangerous behavior. Wayne's primary disruptive behaviors included verbal and physical outbursts and leaving his assigned area. Wayne was placed in the B1 section of CR after completing the CR Placement test at the beginning of the year. CR lessons occurred daily and the peer group and time of instruction remained consistent. With two months of CR instruction alone, Wayne failed to demonstrate reading progress and was nominated by his teacher to participate in this study where he could receive support with oral reading fluency. Initial curriculum based measures at the start of the study indicated that Wayne's reading ability was at the 1.5 grade level.

Measures

Two dependent variables were collected (a) words correct per minute (WCPM) and (b) intrinsic motivation.

Word correct per minute. The median WCPM score from the three *AIMSWeb* probes was used to assess the students' level of oral reading fluency. For each probe, a timer was set for one minute, each probe was scored by marking each error while reading and noting the last word read prior to the timer sounding. Errors were scored following the *AIMSWeb* procedures with an error being omissions, repetitions, words read incorrectly, and words that the student did not know after 3 seconds.

Intrinsic motivation. The Task Evaluation Questionnaire of the Intrinsic Motivation Inventory (IMI; McAuley, Duncan, & Tammen, 1987) was read aloud to be completed by Wayne both before baseline and after the last session of intervention to assess his level of intrinsic motivation

to orally read. The questionnaire included 27-items on a 4-point Likert scale (1=very true, 2=sort of true, 3=just a little true, 4=not true at all). Three of the items were worded negatively and reverse scored. The IMI yields scores in the area (each containing nine items): (a) interest/enjoyment; (b) sense of competence; and (c) perceived effort. Scores for each subcategory are calculated by dividing the yielded score (after items are reverse scored) by 36 and multiplying by 100.

Social validity

Intervention acceptability was assessed by the student using a researcher created questionnaire before the first baseline session and after the last intervention session. Wayne was read aloud a 15-item questionnaire where he responded to each question using a 4-point Likert scale (1=very true, 2=sort of true, 3=just a little true, 4=not true at all). Three of the items were worded negatively and reverse scored. Total scores ranged from 15-60, with lower scores suggesting higher acceptability.

Treatment fidelity

Treatment fidelity was conducted for both phase script adherence and WCPM calculation. The percentage of script adherence fidelity was assessed via direct observation by dividing the total number of observed components by the total number of expected components, multiplying the score by 100. The percentage of WCPM calculation was assessed using the point-by-point method of the total number of agreements divided by agreements plus disagreements, multiplying the sum by 100. See Table 1 for treatment fidelity data.

Inter-observer agreement

Inter-observer agreement (IOA) was conducted on script adherence and WCPM using the same point-by-point formula as treatment fidelity (see Table 1 for results).

Design and Conditions

An ABCB design were used to investigate the functional relation between words correct per minute and self-graphing before reading (B) and self-graphing after reading (C).

Baseline. WCPM was assessed two to four times per week (depending on Wayne's daily schedule) immediately following a *Corrective Reading* session in which he was asked to read aloud three *AIMSWeb* 2nd-grade level probes. The 2nd-grade probes were selected as they were above his current independent reading level but below his frustration level. The interventionists followed a during baseline that included procedures for greeting the student, explaining the reading probe process, starting and stopping each probe, and thanking the student for reading that day (See Figure 1). Reading probes were administered to Wayne outside of the regular classroom either in the hallway or the school's library.

Self-graphing Before Reading. This phase took place immediately following a CR session. During the self-graphing before reading phase, the interventionist followed a script with the same

components used during baseline (greeting the student, etc.) for the three *AIMSWeb* probes and added verbal and visual feedback procedures for graphing the previous day's median score prior to reading (See Figure 1). Wayne used a highlighter to color in a column on his graph his WCPM median score which was provided by the interventionist.

Self-graphing After Reading. This phase occurred immediately following a CR session. A script was followed for this phase (See Figure 1) where Wayne graphed his median WCPM data point from the days 3 *AIMSWeb* probes once he was finished reading. The interventionist calculated this score and told Wayne the number to graph.

Results

Correct Words per Minute

The mean number of CWPM increased over baseline (M=72.00) when self-graphing was added both before (M1=88.50, M2=83.60) and after (M=82.00) reading (see Table 1). Data for each phase also are presented in Table 1 and graphically in Figure 2.

Intrinsic Motivation

Wayne's responses on the IMI pre-intervention were as follows: (a) interest and enjoyment=25%; (b) sense of competence=39%; and (c) perceived effort=25%. These results suggest that prior to the intervention Wayne had low levels of each of interest and competence and put forth little effort in the area of reading. Wayne's responses on the IMI post-intervention were as follows: (a) interest and enjoyment=92%; (b) sense of competence=92%; and (c) perceived effort=92%. These results suggest that following intervention Wayne's interest, competence, and effort regarding reading all improved significantly.

Social Validity

Wayne's rating of acceptability for the intervention was assessed using a social validity questionnaire with possible scores ranging from 15-60 with low scores suggesting high acceptability. Wayne rated the intervention a 51, suggesting low levels of acceptability.

Discussion

Students with E/BD often struggle in both academic and behavioral domains (Reid, Gonzalez, Nordness, Trout, & Epstein, 2004). Without remediation in both domains, in this case by secondary-tier intervention supports, students with E/BD are more likely to experience negative long-term outcomes (Wehby, Falk, Barton-Arwood, Lane, & Cooley, 2003). In this study, self-graphing was used as a targeted, secondary-tier reading intervention within a combined RtI/PBIS model. Self-graphing, whether used before or after a student reads probes, fits within secondary-tier interventions as it doesn't require extensive training to implement and can be implemented with a student as soon as non-responsiveness to universal tier supports is observed; both hall marks of secondary-tier interventions (Hawken, & Horner, 2003). In addition, the self-graphing intervention provides the student an opportunity to be involved in the data progress monitoring process that may assist with motivation to perform better. Wayne's WCPM and IMI data suggest

that the addition of the easy to implement and low cost intervention of self-graphing may enhance the benefits of existing reading programs for students like Wayne whose reading progress was minimal due to his challenging behaviors. Further, self-graphing before Wayne read resulted in a higher mean of WCPM than self-graphing after he read which may suggest that adding self-graphing before a reading probe can increase the intrinsic motivation of struggling readers. This suggestion is made even though Wayne rated his acceptability of the interventions low.

Even with improvement in the number of words read correctly per minute, there are several limitations. First, as a case study there is limited generalizability of the obtained results. Replication of the study across participants is needed to promote generalizability of the effects of the interventions. Second, with only one participating student it was not possible to counterbalance the two interventions. Future researchers should evaluate the effectiveness of the interventions by counterbalancing the interventions across multiple participants. Third, the inclusion of participants with different behavioral and reading needs within alternative education settings is needed.

Implications for Practice and Future Areas for Research

Throughout the intervention sessions, whether it was self-graphing before or after he read, Wayne displayed noncompliant or other inappropriate behavior during all reading instruction and activities. As a student with E/BD who also had history of reading deficits, Wayne's teacher and the interventionist were not surprised by his behavior but it did influence the data collected. There were several instances when a planned session could not occur due to consequences of his inappropriate behavior. Also, if Wayne required prompts during a session he would then read quietly and slower which negatively affected his data. Future researchers may more proactively address his inappropriate behavior through linkages to the SW-PBIS reinforcement system. For instance, he could earn an extra ticket for compliance. In addition, future researchers may collect data on a student's behavior to better monitor and thus potentially address, the influence of behavior on academic measures.

Within this applied setting, a self-contained alternative education school, several potential setting events were observed which may have affected Wayne's performance. Throughout the study Wayne's primary teacher was often absent causing disruptions to his schedule. Researchers report that unpredictable elements in the environment may influence a student with E/BD to engage in inappropriate behavior. Also, students in his class and peers were engaged in inappropriate behavior during activities and some of these students left the school while new students were introduced. These other distractions and different peer groups also may have influenced Wayne's behavior. Researcher will want to better monitor the setting events and their links to student behavior in the future.

Students with E/BD within alternative education settings, like Wayne, may benefit from three-tiered behavioral models of PBIS and academic models such as RtI to address both their behavioral deficits and academic deficits. Currently, there are very few studies using tiered support for this population within alternative education settings even with many researchers calling for these investigations (Lane, Jolivette, Conroy, Nelson, & Benner, 2011). Future

researchers should continue to investigate the effectiveness of various behavioral and academic tiered interventions for students with E/BD.

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Table 1. *Results: WCPM, Fidelity, and IOA*

		Baseline	Before 1	After	Before 2
WCPM	Mean	72.00	88.50	82.00	83.60
	SD	6.48	4.51	7.97	23.64
Treatment Fidelity	Sessions	25%	22%	60%	22%
	Implementation	96%	100%	100%	100%
IOA	Sessions (of Fidelity)	100%	50%	33%	50%
	Agreement	100%	100%	100%	100%
WCPM Fidelity	Sessions	25%	22%	60%	22%
	Implementation	98.55%	98.06%	97.03%	98.06%
IOA	Sessions (of Fidelity)	100%	50%	33%	50%
	Agreement	95.66%	99.67%	99.62%	99.67%

Note: IOA=Inter-observer agreement; WCPM=words correct per minute.

Figure 1. *Baseline, Before, and After Graphing Scripts*

Baseline Script

Today you are going to read three stories out loud to me. You will have one minute to read each story.

1. Teacher presents the first passage:
First please read this one (point) **out loud. If you get stuck, I will tell you the word so you can keep reading. When I say "Stop," I need you to stop reading out loud. Start here** (point to the first word of the passage). **Begin.** Teacher starts the stopwatch when the student says the first word of the passage. While the student reads the teacher records omissions, repetitions, words read incorrectly, and words that the student did not know after 3 seconds. At the end of 1 minute, the teacher marks the word that the student read last. **Stop reading now.** Teacher collects the first passage.

2. Here is your next story (teacher presents the second passage). **Please read this one** (point) **out loud. If you get stuck, I will tell you the word so you can keep reading. When I say "Stop," I need you to stop reading out loud. Start here** (point to the first word of the passage). **Begin.** Teacher starts the stopwatch when the student says the first word of the passage recording all items as for passage 1. **Stop reading now. Here is your next story** (teacher presents the second passage). Teacher collects the second passage.

3. Here is your next story (teacher presents the third passage).
Please read this one (point) **out loud. If you get stuck, I will tell you the word so you can keep reading. When I say "Stop," I need you to stop reading out loud. Start here** (point to the first word of the passage). **Begin.** Teacher starts the stopwatch when the student says the first word of the passage recording all items as for passage 1.**Stop reading now.** Teacher collects the third passage.

Thank you for reading with me today.

Self-graphing *Before* Script	**Self-graphing *After* Script**
Before reading today we will graph your middle score from what you read the last time you read to me. Teacher has calculated words read correct for each probe from the last reading and has determined the median score. **Your middle score that we need to graph is _____** (teacher states the median score**). Last time you read to me was day _____** (teacher states the day that needs to be graphed)**. Please use the highlighter to color in the block for today up to your score _____**(teacher restates median score)**.** Teacher monitors accuracy of highlighting. **Good graphing!** **Today you are going to read three stories out**	**Today you are going to read three stories out loud to me. You will have one minute to read each story.** **1.** Teacher presents the first passage: **First please read this one** (point) **out loud. If you get stuck, I will tell you the word so you can keep reading. When I say "Stop," I need you to stop reading out loud. Start here** (point to the first word of the passage). **Begin.** Teacher starts the stopwatch when the student says the first word of the passage. While the student reads the teacher records omissions, repetitions, words read incorrectly, and words that the student did not know after 3 seconds. At the end of 1 minute, the

loud to me. You will have one minute to read each story.

1. Teacher presents the first passage:
First please read this one (point) **out loud. If you get stuck, I will tell you the word so you can keep reading. When I say "Stop," I need you to stop reading out loud. Start here** (point to the first word of the passage). **Begin.** Teacher starts the stopwatch when the student says the first word of the passage. While the student reads the teacher records omissions, repetitions, words read incorrectly, and words that the student did not know after 3 seconds. At the end of 1 minute, the teacher marks the word that the student read last. **Stop reading now.** Teacher collects the first passage.

2. Here is your next story (teacher presents the second passage). **Please read this one** (point) **out loud. If you get stuck, I will tell you the word so you can keep reading. When I say "Stop," I need you to stop reading out loud. Start here** (point to the first word of the passage). **Begin.** Teacher starts the stopwatch when the student says the first word of the passage recording all items as for passage 1.**Stop reading now.** Teacher collects the second passage.

3. Here is your next story (teacher presents the third passage). **Please read this one** (point) **out loud. If you get stuck, I will tell you the word so you can keep reading. When I say "Stop," I need you to stop reading out loud. Start here** (point to the first word of the passage). **Begin.** Teacher starts the stopwatch when the student says the first word of the passage recording all items as for passages 1 and 2. **Stop reading now.** Teacher collects the third passage.

Good reading! Thank you for working with me today.

teacher marks the word that the student read last. **Stop reading now.** Teacher collects the first passage.

2. Here is your next story (teacher presents the second passage). **Please read this one** (point) **out loud. If you get stuck, I will tell you the word so you can keep reading. When I say "Stop," I need you to stop reading out loud. Start here** (point to the first word of the passage). **Begin.** Teacher starts the stopwatch when the student says the first word of the passage recording all items as for passage 1.**Stop reading now.** Teacher collects the second passage.

3. Here is your next story (teacher presents the third passage). **Please read this one** (point) **out loud. If you get stuck, I will tell you the word so you can keep reading. When I say "Stop," I need you to stop reading out loud. Start here** (point to the first word of the passage). **Begin.** Teacher starts the stopwatch when the student says the first word of the passage recording all items as for passages 1 and 2. **Stop reading now.** Teacher collects the third passage.

Teacher calculates words read correct for each probe and determines the median score.

Thank you for reading. Now we will graph your middle score from what you read today. Teacher presents the student with his graph and a highlighter. **Your middle score that we need to graph is _____** (teacher states the median score)**. Today is day ____** (teacher states the day that needs to be graphed)**. Please use the highlighter to color in the block for today up to your score _____**(teacher restates median score)**.** Teacher monitors accuracy of highlighting.

Good graphing! Thank you for working with me today.

Figure 1. *Wayne's WCPM for each Phase*