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Efficacy of a Self-monitoring Technique to Improve Academic Skill Production

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EFFICACY OF A SELF-MONITORING TECHNIQUE TO IMPROVE ACADEMIC SKILL PRODUCTION

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Dissertation Approval

This is to certify that the thesis presented to us by **Carrie L. Winfield** on the **18th** day of **May, 2010,** in partial fulfillment of the requirements for the degree of Doctor of Psychology, has been examined and is acceptable in both scholarship and literary quality.

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Abstract

This study examined archival data from an assisted self-graphing intervention for improving early literacy skills in first grade students from one elementary school. The purpose of the investigation is to examine the use of a self-graphing supplemental intervention that occurred outside of the class-wide first grade reading instruction. The participants included first grade students from three classroom settings in one predominately middle class, suburban school district in southeastern Pennsylvania. The participants formed three groups: (1) 8 students in a DIBELS Progress Monitoring and Self-Graphing Intervention group (PM + SG group); (2) 9 students in a DIBELS Progress Monitoring-only group (PM group), and (3) 49 students in a Non-intervention & Non-progress Monitoring group (NI group). Two subgroups from the NI group were identified for the purposes of a PSF comparison group and a NWF comparison group (12 students NI group for PSF and 11 students in NI groups for NWF). The PSF and NWF comparison group performances were compared with performances of participants in the PM + SG group and the PM group on the PSF and NWF measures. The students in the PM + SG and PM groups were identified as "at risk" readers in the skill areas either of Phoneme Segmentation Fluency, Nonsense Word Fluency or both Phoneme Segmentation Fluency and Nonsense Word Fluency based on the Dynamic Indicators of Early Literacy Skills (DIBELS) assessment. The students in the PM + SG group self-graphed their Phoneme Segmentation and/or Nonsense Word Fluency scores immediately following the DIBELS assessment. This group of participants was selected, based upon the higher number of students who were identified as "at risk" from this classroom setting when compared with the other two classroom settings. The participants in the PM groups were provided only with the bi-weekly progress monitoring during the intervention

period as a means for continued formative evaluation as well as for intervention evaluation. All participants were provided with pre- and post-assessment DIBELS measures. At the end of the intervention period, the students and teacher involved in the self-graphing intervention were surveyed regarding the effectiveness of the intervention. Findings indicated that reading fluency production increased for all the students in the participant groups (PM + SG, PM, and NI subgroups for PSF and NWF). The students that participated in the self-graphing intervention did demonstrate higher levels of growth along with higher reading fluency scores than the other participant groups. These findings lend support to the literature in the field of self-monitoring and self-graphing as a method for improving student performance.

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Introduction

Students who are self-regulated learners are active participants in their own learning. Self-regulated learners use their abilities, strategies, and the regulation of their environment as part of the achievement process. Self-regulation is defined as "self-generated thoughts, feelings, and actions that are planned and cyclically adapted to the attainment of personal goals" (Zimmerman, 2005, p.14). Self-monitoring has been described as a critical self-regulation process that affects both behavior and academic performance (Harris, Friedlander, Saddler, Frizzell, & Graham, 2005). Some also refer to self-monitoring as an aspect of self-management (Gureakso-Moore, DuPaul, & White, 2007). The ability for self-regulation is being recognized increasingly as an essential part of social development and the ability to learn in school (Howse, Calkins, Anastopoulos, Keane, & Shelton, 2003). The ability to regulate behavior is a valuable skill because it apparently has not only individual and group survival value (Kanfer, 1977) but it also it reflects intelligence and socialization skills (Kanfer, 1971). Zimmerman (2005) asserts that one of the most important human capabilities is self-regulation. This capability allows us to adapt and even prosper when conditions in our environment change. In the school setting, the application of self-regulatory behaviors results in increased achievement and positive teacher feedback, which leads to more positive self-efficacy (Schunk, 2001). Self-regulated learners will be able to apply their knowledge to academic tasks, and also have skills that can be applied across contexts.

In classroom settings, self-regulatory abilities are considered a critical part of the child's development and learning process (Harris et al., 2005). Self-regulation is a type

of student-directed learning strategy (Lee, Palmer, & Wehmeyer, 2009) that increases the student's control of his or her learning (DuPaul & Stoner, 2002). It involves a process in which the students plan and guide their behavior toward the achievement of an established learning goal (Metzler, 2007). Self-regulation can help students modulate their behaviors while engaging in a wide variety of tasks (Harris, Friedlander, Saddler, Frizzell, & Graham, 2005; Reid & Harris, 1993). Research has indicated that self-regulation interventions can assist in student development of responsible and independent work skills (Fantuzzo, Polite, Cook, & Quinn, 1988). This strategy avoids the "hidden curriculum" of most behavioral interventions in which the behavior is regulated by others (Graham, Harris, & Reid, 1992). It has been noted by several researchers that the transfer of teacher control to student self-regulation is critical to the learning process (Jitendra, Hoppes, & Xin, 2000). The goal of education is to develop life-long learning skills that will assist in the ability to meet academic standards. It appears that the development of student self-regulation and self-monitoring skills would help to develop these life-long learning skills needed for academic success. Educators also need to foster skills that will extend beyond the academic environment.

Statement of the Problem

There exists a need to develop self-regulation skills in students. It has been shown that self-regulated learners use their abilities and adaptive strategies to assist with academic achievement (Harris, 1982). Self-regulatory abilities are desirable, but do not always develop naturally for some children (Harris & Schmidt, 1997). There also exists a need for evidence-based strategies that will help improve academic performance. Self-monitoring techniques, which can help to develop self-regulation, are also considered

research-based strategies. Self-monitoring techniques can be used as a targeted intervention to improve all students' learning and can be used in a variety of settings (Harris et al., 1994; Harris, 1986; Shapiro et al., 2002; Reid, 1996). Self-monitoring interventions not only assist with the development of self-regulation, but have also been found to increase academic engagement and enhance academic skills across content areas, such as reading and mathematics (DiGangi, Maag, & Rutherford, 1991; Harris, 1986; Lalli & Shapiro, 1990). Self-monitoring strategies have been known to improve performance in specific skill areas of reading accuracy (McLaughlin & Truhlicka, 1983; Lalli & Shapiro, 1990), reading fluency (Bray, Kehle, Spackman, & Hinze, (1998), and comprehension (Jitendra et al., 2000). These findings have important implications for educators who are working toward achieving student academic goals while also fostering the development of student self-control.

Doll, Zuckerman and Brehm (2004) described resilient classrooms as an environment in which all children can be emotionally, socially, and academically successful. Through their research of resilient classrooms, several common classroom characteristics were identified as helping children become more academically and interpersonally successful. Three of these characteristics include the promotion of academic efficacy (students viewing themselves as competent learners), academic self-determination (students working toward self-selected learning goals), and behavioral self-control (students behaving adaptively with minimal adult direction). The development of these skills is important in creating an educational environment that promotes student success. The use of self-monitoring interventions would appear to be one method that

could help foster a resilient classroom environment and also improving student self-regulation and specific academic skills.

Students with weaknesses in actively self-regulating their behaviors, demonstrate difficulties with attending to tasks or completing academic work (Harris, 1986; Harris et al., 2005). Weaknesses with self-regulation make it more difficult to access the general education curriculum (Lee et al., 2009). Given the importance of self-regulation, it would be advantageous to develop students' skills further by providing classroom activities and interventions that target these skills. Not only would it be beneficial to provide interventions to students with self-regulation deficits, it would also be beneficial to provide these interventions for a wide range of students. A type of intervention that has been demonstrated as effective for developing self-regulation skills in students is self-monitoring (Lloyd & Landrum, 1990).

Despite a great deal of research in the area of self-monitoring, there has been only a small amount of research conducted with young students. In addition, research involving self-monitoring methods as a supplement to instruction in early reading intervention is also lacking. Another limitation in the self-monitoring literature is that the bulk of the research has been conducted in special education classroom settings (Webber, Scheuermann, & McCall, 1993). There have been only a few studies conducted in general education settings. All of these studies found increases in student academic engagement, productivity, or accuracy (Rock, 2005). Two studies (Fuchs, Fuchs, & Bahr, 1990; Fuchs, Fuchs, Bahr, Fernstrom, & Stecker, 1990) demonstrated educator acceptance of self-monitoring interventions in general education settings along with educator perceptions of the intervention's being useful for difficult-to-teach students.

Given the critical need to develop the academic skills of all students and the efficacy of self-monitoring as an intervention, it would be advantageous to explore the relationship between the use of self-graphing as a self-monitoring method and academic skill production in the area of reading. It would be beneficial to investigate the use of self-monitoring interventions within the context of a general education curriculum. Additional evidence regarding the validity of self-graphing as an intervention is also needed to support its use with young children.

The Importance of Self-Monitoring

Research data have indicated self-monitoring to be a simple, effective tool for helping students to improve not only on-task behavior, but also academic performance (Axelrod, Zhe, Haugen, & Klein, 2009; Harris, 1986; Harris, Graham, Reid, McElroy, & Hamby, 1994; Shapiro, Durnan, Post, & Levinson, 2002). The efficacy of self-monitoring techniques in academic settings with children has been studied since the 1970s (Broden, Hall, & Mitts, 1971). Self-monitoring techniques have been found effective among diverse student populations, and the techniques have also been found effective across a variety of academic domains (Reid, 1996).

Self-monitoring of performance provides the student with immediate feedback. Several studies have indicated that individuals receiving more immediate and frequent external feedback during practice made fewer errors or reached the performance criterion faster than those who received delayed or less-frequent feedback (Goodman, 1998). A method of self-monitoring of performance would include self-graphing. Self-graphing provides a visual model of the student performance over time (Sutherland & Snyder, 2007) and helps students assess whether or not they have met their goals (Magnan, 2006).

Once the students are more aware of their goals, it makes them more likely to achieve those goals (Lee, Palmer, & Wehmeyer, 2009). Self-monitoring of academic performance through the use of self-graphing has also been found to increase academic achievement and production because it allows for immediate and frequent performance feedback. Past research has indicated that self-graphing is associated with improvements in reading fluency and comprehension, mathematics, and written expression (Gunter, Miller, & Venn, 2003; Shimabakuro, Prater, Jenkins, & Edelen-Smith, 1999).

Teaching a student to monitor and self-graph his or her own academic progress has shown several benefits. The student may feel more heavily invested in his or her learning process and motivated to perform at a higher level. Being able to see the progress on graphs may be more rewarding than simply receiving grades. Having the students plot their performances on graphs allows for discussion regarding causes for increase or decrease. Providing a criterion-referenced goal for performance also allows the student to visualize where they should be performing. Self-graphing may motivate the student because it can be viewed as a game or competition.

The collection and graphing of data is an important component in today's educational climate of teacher and school accountability. Self-graphing can help to organize this data, providing a numeric and visual representation of performance to the student (Deno, 1986; Mace & Kratochwill, 1988). Recording and graphing student progress helps to provide data that can be shared with students, teachers, parents, and administrators. Self-graphing of academic performance can be utilized across a variety of academic settings and situations. The efficacy, versatility, and simplicity of the

technique may make it a viable option as a self-monitoring intervention in and of itself or as part of an intervention program to help students meet academic goals.

The Importance of Early Identification & Intervention in Reading

The No Child Left Behind Act (NCLB) of 2001 (U.S. Department of Education, Public Law 107-110) has had a dramatic impact upon the field of education. NCLB requires the use of periodic standardized assessments to make curriculum and school improvements. NCLB asserts that systematic testing will reveal those schools which are not teaching basic skills effectively so that interventions can be used to improve the outcomes for all students and also reduce the achievement gap for disadvantaged and disabled students. The act includes language that requires instructional practices that are based on scientifically-based research along with preventative interventions. The focus is on improving the achievement of all students and requires that states and school districts implement procedures that involve ongoing assessment and interventions to assist students.

Unfortunately, there has been a precedent of school systems relying on a wait-to-fail model prior to identification and intervention. Systematic identification is often not initiated until the third grade, which results in more intensive and costly interventions. A school-based "preventive model" of early intervention should be employed rather than using the traditional "remedial model" (Torgesen, 1998). Effective intervention should appropriately assess and identify children at risk at the earliest stage possible (Adams, 1990; Snow et al., 1998, Stanovich, 1986). For example, a 2006 study demonstrated that students who were identified as at-risk for reading problems in kindergarten and who receive some form of intervention, performed better on measures of emergent literacy

skills than students who did not receive intervention. Further, these students were considered no longer at-risk for reading problems in first grade and beyond (Vellutino, Scanlon, Small, & Fanuele, 2006).

The research on early literacy indicates that improved early identification, instruction, and intervention can improve children's reading skills. For example, a great deal of evidence suggests that explicit, intensive, and supportive instruction is effective in improving students' reading skills (Torgeson, 2002). A study by Foorman, Francis, Fletcher, Schatschneider, and Mehta (1998) indicated the importance of appropriate classroom instruction toward reducing reading failure among students in the first and second grades. This study involved three early intervention programs with 285 students who were provided with three variations of reading instruction. The first group was provided with direct instruction in letter-sound correspondence; the second group was provided with less direct instruction in sound-spelling patterns, and the third group was provided implicit instruction in the alphabetic code. Results demonstrated that students who were provided with direct instruction demonstrated faster gains in word reading and increased word recognition skills. The authors concluded that early intervention can be effective in reducing reading failure when the appropriate strategies and instruction methods are implemented.

According to the National Research Council, most reading difficulties can be prevented (Snow, Burns, & Griffin, 1998). Programs designed for prevention and early intervention that are delivered by well-trained teachers have been found to assist 85 to 90 percent of poor readers in increasing their reading skills to an average reading level (Lyon, 1997). Early intervention can be effective, but without appropriate methods of

identifying students who are at risk and making decisions about their instruction, interventions may not be delivered appropriately. This highlights the need for quality assessment tools that measure children's pre-reading and early literacy skills while also helping to inform the instruction of teachers.

Formative assessment is a reflective process with the purpose of promoting student success (Crooks, 2001). It has also been defined as a process between teacher and student used to recognize, respond, and enhance learning (Cowie & Bell, 1999). Through the use of formative assessment, instructional interventions are treated as hypotheses that need to be tested and validated (Deno, 1986). The assessment is considered 'formative' when the feedback from the task is used to adapt teaching methods to help meet student learning needs. Formative assessment measures should measure student progress and also assist teachers to determine student need and goals. Research on formative assessment and performance feedback has found that these processes can help students develop self-regulated learning skills (Nicol & Macfarlane-Dick, 2006).

In addition to formative assessment, evidence-based interventions that develop student independence and increase performance are also necessary (Collins & Salzberg, 2005). These tools should help educators provide meaningful instruction that targets the five areas of reading and can provide early intervention to students. After at-risk students begin to struggle with critical basic skills, the intensity of interventions required for these students to attain grade level expectations is substantial. This highlights the need for early assessment and academic interventions of at-risk students to help develop fundamental academic skills that are necessary for success in school. These interventions

along with methods for improving student's self-regulation skills should serve to improve the academic and overall functioning for many students.

Purpose of the Study

The current study will extend the literature on the efficacy of self-monitoring techniques on academic skills. Specifically, the study will analyze existing classroom data to compare educational outcomes of students who were trained to utilize graphing techniques to self-monitor their reading performance with students who received similar reading interventions without using explicit self-monitoring techniques. It is hypothesized that students who participate in this self-graphing intervention to monitor and record their reading fluency will demonstrate significant gains in reading fluency skills when compared with a group of same-grade students who are not provided with this intervention. The analysis of data will empirically test the prediction that participation in self-monitoring of academic goals (i.e., reading fluency scores) will produce an increase in attainment of academic goals when compared with students who do not self-monitor their performances. In addition, student and teacher perceptions of the reading intervention program will be analyzed.

The findings from this study will examine self-graphing techniques as a method for improving academic skill production. It is speculated that the use of the outlined intervention model will assist the school in the efforts to link assessment with early identification, intervention, and student progress monitoring. The goal is for improving the student's early literacy skills, thus reducing the number of students who are considered at-risk readers. This reduction in students at-risk for reading failure should lead to a reduction in retention rates, referrals and placements to special education

programs, and ultimately to determine a better future prognosis for students with improved academic performance and lower dropout rates.

Research Questions

The research questions to be examined in this study are:

(1) Will the use of a self-monitoring intervention help to improve academic skill production in the area of reading fluency?

(2) Will there be a difference in academic skill production when comparing students who received a self-monitoring intervention with students who did not receive a self-monitoring intervention?

(3) Will student and teacher questionnaires result in positive perceptions of the self-monitoring intervention?

Chapter 2

Related Research

Self-Monitoring

Self-monitoring is defined as occurring when an individual determines whether or not a specific behavior has occurred (Nelson & Hayes, 1981). Self-monitoring involves an active engagement of the individual, self-observing occurrences of a target behavior (Lee, Palmer, & Wehmeyer, 2009). Self-monitoring can also involve self-recording the frequency of the behavior (Lannie & Martens, 2008). It has been found that self-monitoring works best when self-assessment is paired with self-recording (Graham, MacArthur, Schwartz, & Page-Voth, 1992). The process of self-monitoring may also include self-reinforcement for meeting or exceeding an established criterion or goal (Nelson & Hayes, 1981). The technique serves to increase and/or decrease target behavior(s) or skills (Lalli & Shapiro, 1990). Self-monitoring helps call attention to an aspect of the student's learning or academic production that needs to be accomplished (Lee et al., 2009).

Self-monitoring has been a widely used technique among diverse student populations in a variety of settings. Research has shown self-monitoring to be an effective tool for helping students improve not only on-task behavior, but academic performance as well (Harris, 1986; Harris, Graham, Reid, McElroy, & Hamby, 1994; Shapiro, Durnan, Post, & Levinson, 2002). The efficacy of self-monitoring techniques in academic settings with children has been studied since the 1970s (Broden, Hall, & Mitts, 1971). Self-monitoring strategies have been used with students with intellectual and learning disabilities, and Attention Deficit/Hyperactivity Disorder (ADHD). Self-

monitoring techniques have also been used in both special and general education settings to increase students' academic engagement and productivity (Rock, 2005).

Students with poor self-monitoring skills tend to make frequent, careless errors when working, have difficulty proofreading, and may not follow assignment directions. They have trouble evaluating their own performances and also have difficulty appropriately distributing effort and academic planning (Levine, 1998). These weaknesses certainly can have academic implications and can create a need to improve self-monitoring skills. The efficacy of self-monitoring techniques among a range of academic skill areas has been established (Gunter, Miller, & Venn, 2003; Lalli & Shapiro, 1990; Reid, 1996; Shimabukuro, Prater, Jenkins, & Edelen-Smith, 1999).

In a comprehensive review of research in self-monitoring with students who have learning disabilities, Reid (1996) reviewed 17 experiments from 1979 to 1994 that focused on the effects of self-monitoring on academic productivity (i.e., amount or rate of academic response). The results of early studies were mixed. However, it was found that the studies that were conducted after 1986 consistently found positive effects on academic productivity. Reid concluded that self-monitoring with students with learning disabilities could be considered a mature intervention. Reid also added that self-monitoring is a technique that can be utilized within the classroom setting. Additional research has supported these findings. Research has demonstrated that self-monitoring techniques have been effective for improving reading accuracy (Lalli & Shapiro, 1990; McLaughlin & Truhlicka, 1983), reading fluency (Bray, Kehle, Spackman, & Hintze, 1998), comprehension (Jitendra et al., 2000), writing skills (Anderson-Inman, Pain &

Deutchman, 1984; Sexton, Harris, & Graham, 1998), spelling performance (Harris et al., 1994), and math accuracy and production (DiGangi, Maag, & Rutherford, 1991).

It should be noted that although self-monitoring has been associated with increases in accuracy and production, self-monitoring in and of itself does not teach students how to improve their performances or skills. Self-monitoring serves as a method of heightening the students' awareness of their performances. Self-monitoring alone should not be used to develop new skills or as the only method for remediating a student's weakness; however, it can be used to supplement instruction and to assist in student skill development with practice activities (Reid, 1996). According to Mel Levine (1998), "the ability to detect one's own errors plays an indispensable academic role in all subject areas" (p. 39). Self-monitoring has been established as an effective, simple, inexpensive, and less-intrusive classroom intervention (Fantuzzo & Polite, 1990). It is a technique that has an extensive literature base for reference by practitioners when implementing this type of intervention (Reid, 1996).

Self-Monitoring of Attention and Self-Monitoring of Performance

Two types of self-monitoring are frequently utilized in educational research. They include self-monitoring of attention (SMA) and self-monitoring of performance (SMP). SMA involves teaching students to self-assess their attentive behaviors and to self-record at random cue intervals, with the goal to increase on-task behaviors and academic engagement. SMP involves teaching students to self-assess a specific feature of their academic performances and to self-record the results, typically using a chart, graph, or tally sheet, with the goal to increase academic functioning (Reid, 1996). SMP can be used to measure productivity (the number of completed tasks) and accuracy (the number of

correct responses). SMA expects that an increase in on-task behavior will result in academic growth, whereas SMP expects that a growth in academic functioning will increase on-task behavior (Harris et al., 2005; Reid & Harris, 1993).

Reid's (1996) review found 22 studies measured on-task behavior and 21 of these 22 studies reported increases as a result of SMA and/or SMP. Reid concluded that the studies that were reviewed strongly support the hypothesis that self-monitoring can positively influence academic performance with regard to rate and number of academic response. The behavior change that results is a form of reactivity. Barlow, Hayes and Nelson (1984) refer to this effect as the reactivity of self-monitoring. The reactive aspects of self-monitoring have been indicated across a wide range of students, settings, and disabling conditions (Lalli & Shapiro, 1990; Mace, Shapiro, West, Campbell, & Altman, 1986). SMA and SMP are considered appropriate interventions that can be easily implemented by classroom teachers (Reid, 1996). For the purpose of this study, self-monitoring of performance will be examined.

Performance Feedback

Performance feedback has been defined as providing students with information regarding their performance (Ysseldyke & Elliott, 1999) and can be delivered using various methods, such as verbal feedback, self-scoring, response cards, or graphing (Eckert, Dunn, & Ardoin, 2006). Performance feedback is a type of external feedback providing information that helps the individual produce a more accurate response on the following trial. John Hattie (1992) analyzed approximately 8,000 studies and made the following statement regarding feedback, "The most powerful single modification that enhances achievement is feedback. The simplest prescription for improving education

must be 'dollops of feedback" (p.9). Therefore, a routine strategy that a teacher can use to improve classroom performance is to provide students with feedback (Marzano, Pickering, & Pollock, 2001).

Differing types of performance feedback have been provided to students in previous studies, including assignment completion (Kastelen, Nickel, & McLaughlin, 1984), correct or incorrect answers (Eckert et al., 2006) and total answers produced (VanHouten, Morrison, Jarvis, & McDonald, 1974). For many years, performance feedback in the area of reading has been found to be an effective tool in improving students' decoding and reading comprehension (Pany & McCoy, 1988; Van Houten, Hill, & Parsons, 1975). Several studies have indicated that individuals receiving more immediate and frequent external feedback during practice made fewer errors or reached the performance criterion faster than those who received delayed or less-frequent feedback (Goodman, 1998). According to Marzano et al. (2001), feedback should also be criterion-referenced (i.e., reference a specific level of skill or performance). One method that teachers can use to provide prompt and frequent feedback to all students within the general classroom setting is to graph student performance. The feedback could also be designed to be criterion-referenced to help the student better understand their functioning as it compares to grade level performance expectations.

Performance Feedback in Graphic Form

Measuring student progress is important when attempting to modify the academic performance of students (Zigmond & Miller, 1986). Graphing is a simple intervention strategy in which no major changes are made to the instructional process. The focus of intervention is to provide performance feedback that may serve as motivation for students

to exceed previous academic performance (Shapiro, 2004). The graphing technique can be used with students of various age and grade levels. Graphing can be completed by the teacher or by the student. Graphing allows for students and teachers to see small increases in student progress which may have gone unnoticed. The inability to detect small changes in student performance may be a contributing factor to teacher burnout and the feeling of teacher helplessness (Ysseldyke & Algozzine, 1982). Consistent progress monitoring and graphing of student performance may help to ease teacher frustration.

Graphing of student data allows for the opportunity of teacher and student dialogue regarding performance and possible strategies to help improve performance. It also helps with student awareness of goals and insight into possible reasons for increases or decreases in performance. In a study by L.S. Fuchs and Fuchs (1986), it was found that performance feedback resulted in significant increases in academic achievement. Also, the effects of this intervention were enhanced when the data from performance evaluations was graphed rather than being simply recorded. It was speculated that this effect may be due to the fact that graphing of performance data allowed for more frequent feedback to the students. In a later study by Fuchs and colleagues (1991), results showed that providing goal-line feedback on graphs to students produced greater performance results than providing graphs with no goal-line feedback. Fuchs and Fuchs (n.d.) recommend the use of graphed analysis for academic measurement to help teachers plan more effective programs. This recommendation is based on their review of studies conducted from 1984 through 2000 that strongly suggest the improvement on students' reading, spelling, and mathematics achievement when teachers graph Curriculum Based

Measurement (CBM) progress monitoring data to assist with instruction and to help set student goals.

Self-Graphing

Self-graphing is a form of self-monitoring that is described as a type of self-evaluation in which students graph their own results. Self-graphing provides a visual model of the student performance over time (Sutherland & Snyder, 2007) and helps the student assess whether or not they have met their goal (Magnan, 2006). Self-graphing is an explicitly taught self-management skill that has been indicated to improve a wide range of skills for students with disabilities (Cooper, Heron, & Heward, 2007). It can be especially meaningful for a student to chart his or her own progress and to record progress with a colorful graph (Levine, 1998). Self-graphing alone appears to have a positive effect on improving recorded performances. A 1999 study (Shimabukuro et al.) involved three students with learning disabilities and with ADHD and found positive effects on academic performance. These students self-monitored their academic accuracy and productivity in the areas of math, reading comprehension, and written expression. The students recorded their scores on a graph. Results indicated that all students improved their accuracy and productivity.

Additional research has indicated positive effects in a wide range of areas as a result of students self-recording their performance data (Moxley, 1998). One study (Farrell, 2007) found that a self-monitoring plus a self-graphing intervention assisted in mathematics fluency and accuracy increases of five high school students. A 2008 study (Stotz, Itoi, Konrad, & Alber-Morgan) found an increase for written productivity of 3 fourth grade students with learning disabilities upon the implementation of a self-

graphing intervention. The social validity and treatment acceptability of the intervention was also examined. The students reported that the graphs were helpful and the teacher reported ease in implementation and positive effects on student performance. The reactive effects of self-monitoring suggest that student performance will improve when self-graphing is used (Moxley, 2007).

Self-graphing of academic performance can also be used as a progress monitoring tool to help teachers identify student functioning and instructional needs. Gunter and his colleagues (2002) reported the following, "Students we work with have become not only able to assist with the data-collection process and enhance their performance, but they often expressed enthusiasm for graphing their own performance" (p.30). Self-graphing could be viewed as a time saving tool for teachers who use the students to graph their own data rather than having the teacher record the data. In a study by McCurdy and Shapiro (1992), it was found that learning disabled students were able to reliably collect CBM data on themselves and their peers. DiGangi, Maag, and Rutherford (1991) concluded that self-graphing was a simple and cost-effective tool for enhancing the reactivity of self-monitoring of behavior and academic performance. The self-graphing technique is supported by the many benefits that have been reported in the literature. Some of these benefits include the mere act of learning to graph, the motivational benefits, the immediate performance feedback; in addition, students have reported this technique as enjoyable.

A limited number of studies exist in the area of self-graphing of academic performance. There are fewer studies that involve student self-graphing of reading performance. One study compared teacher-graphing to self-graphing and found that both

methods were equally effective in improving the oral reading rate of the student (Diebolt, 1992). Gunter, Miller, & Venn (2003) investigated self-graphing of oral reading rate using a withdrawal of treatment case study design. The student used a computer to record and to graph the performance data. It was found that the oral reading rate improved when student self-graphed. Eckert and his colleagues (2006) examined the effects of performance feedback on words read correctly and words read incorrectly on the oral reading fluency of students. The performance feedback was provided using bar graphs. The results indicated that providing students with performance feedback on the number of words read correctly may enhance the reading fluency of students with reading difficulties. In a study by Sutherland and Snyder (2007), the effects of self-graphing reading performance on the reading fluency of middle school students with emotional or behavioral disorders were examined. During the intervention phase, the students made progress on the words read correctly per minute; the students also reported that they enjoyed the self-graphing component of the intervention.

There are even fewer studies that involve young students' self-graphing their oral reading fluency. In a study by Magnan (2006), the efficacy of assisted self-graphing for improving early literacy skills of kindergarten students was investigated. In a study by Gessley (2006), it was determined that the second and third grade participants were capable of self-graphing, with adult assistance. The results demonstrated a significant increase in the oral reading rates of the students who were determined as at-risk readers with a lesser increase in the oral reading rates of students determined as on-grade level readers. The paucity of research in this specific area along with the critical need to

develop all students' early literacy skills and the call for empirically-validated reading interventions create a need to examine the topic further.

Goal Setting

Goal setting and self-monitoring are considered to be the initial steps towards self-regulated performance (Agran, 1997). As previously discussed, self-regulation skills are critical to assist student functioning within the classroom setting. As a self-directed learning strategy, the student is able to compare his or her self-monitored behavior or performance against a criterion goal in order to help maintain awareness of the goal (Lalli & Shapiro, 1990). The students' awareness of their goals make them more likely to achieve their goals (Lee et al., 2009). One of the advantages of goal setting and self-monitoring can be the generalization of skills (Agran, King-Sears, Wehmeyer, & Copeland, 2003). Studies involving goal-setting interventions have demonstrated that setting goals has a positive effect on the academic performance of students with disabilities across academic areas, including reading, writing, and math (Johnson, Graham, & Harris, 1997; Page-Voth & Graham, 1999; Troia & Graham, 2002). It is also noted that resilient classrooms demonstrate student self-determination through the use of academic goal-setting (Doll, Zucker, & Brehm, 2004).

A study that involved goal setting and self-graphing found that oral reading rate significantly improved after self-graphing was conducted (Glor-Schieb & Zigmond, 1993). Following a baseline measure, each student graphed his or her progress along a goal line. This study also utilized a survey to measure student attitude regarding the intervention. Not only did performance improve, but it was also found that student attitudes toward the goal setting and self-graphing intervention were positive.

A recent study involved high school students with disabilities who set academic goals in core classes (English, math, social studies, and science) and self-monitored progress towards the goals (Lee, Wehmeyer, Palmer, Soukup, & Little, 2008). It was found that the students achieved the targeted academic goals at or above the mean level of performance. Students reported additional benefits of increased organization, participation and confidence, better understanding of assignments, better home study habits, and less stress over task completion. Teachers reported that self-monitoring sheets were helpful to maintain student focus on the goals.

The use of self-monitoring skills as a tool for student self-regulation has been shown to have important academic implications. The development of these skills has been indicated as increasing student academic skill development and production. Self-monitoring of academic performance through the use of self-graphing has also been found to increase academic achievement and production because it allows for immediate and frequent performance feedback. The use of criterion-referenced goals appears to help the student visualize the academic skill expectation and may help motivate the student to attain their goals. Self-graphing of academic performance can be utilized across a variety of academic settings and situations. The efficacy, versatility, and simplicity of the technique make it a viable option as a self-monitoring intervention in and of itself, or as part of an intervention program to help students meet academic goals. This technique can be considered especially useful when used in conjunction with an intervention that would target the early academic skills of students.

The Importance of Reading

One purpose of the No Child Left Behind Act (NCLB) of 2001 (U.S. Department of Education, Public Law 107-110) is to ensure that all children are reading on target by the end of Grade 3. This is the largest initiative ever undertaken by the United States to prevent reading problems in young children. This initiative is based on data indicating that many students are struggling with reading. For example, it has been estimated that more than 17% of the general school-age population have problems with reading during the first three years of schooling (National Institute of Child Health and Human Development [NICHHD], 2000). Students who read poorly at the end of first grade have an 88 percent chance of reading poorly at the end of fourth grade (Juel, 1998). In addition, the Nation's Report Card (U.S. Department of Education, 2002) reported that only 32 percent of fourth graders are proficient readers. Longitudinal studies have estimated that 75% of third grade students who have had reading problems continued to experience reading problems in ninth grade (Shaywitz, Holford, Holahan, Fletcher, Steubing, Francis, & Shaywitz, 1995). This suggests that students who experience reading problems are at high risk for future academic difficulties and emphasizes the need for early intervention.

Reading is a basic academic skill that is critical to all school-based learning. Reading is central to all academic tasks required for students. Early identification and interventions for students with reading problems have been suggested because of findings that students who experience reading problems are at high risk for future academic difficulties (Shaywitz et al., 1995) and other associated problems. As early as 1970, Rutter and Yule hypothesized that reading problems, along with the frustrations and

failure experienced by students, can lead to "acting out" disruptive behavior, anxiety, and other problems. One recent study found that reading problems may contribute to the early onset of conduct disorders (Bennett, Brown, Boyle, Racine, & Offord, 2003). The National Center for Education Statistics (2005) indicate that 70 percent of the prison population demonstrates reading abilities at the two lowest levels of proficiency. Approximately 50 percent of adolescents and young adults with criminal records reported problems with reading (Lyon, 2001). Adults with higher reading abilities earn more, but more than 40 percent of adults with reading deficiencies live in poverty (McCombs, Kirby, Barney, Darilek & Magee, 2004). Reading ability is considered highly valued and is important for social and economic advancement (Snow, Burns, & Griffin, 1998). Clearly, reading is critical for success in our society.

Early Literacy Skills

Early identification of students who are most at-risk for reading failure is essential to the prevention of illiteracy. This is considered a national priority, as illustrated in NCLB of 2001. Research has demonstrated that difficulties with reading may hinder the development of language, knowledge, and vocabulary skills. This phenomenon is referred to as the "Matthew Effect" (Stanovich, 1986). This is the concept that the rich get richer and the poor get poorer or, in the case of school systems, the wait-to-fail model leads to an increased number of global academic difficulties for students as they progress in school (Dunn, 2007; Fuchs, Fuchs, Mathes, Lisey, Roberts, 2001). Stanovich (1986) found that students who experience early success in acquiring reading skills usually experience later successes in reading, but that failing to learn to read before the third or fourth year of schooling may be indicative of life-long problems in learning new skills. It

was reported that students who fall behind in reading, read less, thus increasing the gap between them and their peers. In later grades, the students' reading difficulties create difficulties in most other subjects. Therefore, the student falls further and further behind in school, dropping out at a much higher rates than their peers.

Without successful early intervention, reading problems can lead to costly and wide-ranging, long-term negative outcomes for the individual and society (Maughan, Gray, & Rutter, 1985). Students with reading problems are often provided with remedial reading services. Students who continue to struggle with reading as they progress in school are often referred for a formal multidisciplinary evaluation to determine if the student has a specific learning disability. It has been reported that more than 50 percent of the children receiving services under the Individuals with Disabilities Education Act (IDEA) have a disability category of specific learning disability. Of those students, approximately 90 percent have a specific learning disability in the area of reading (Bradshaw, 2003). The difficulties in reading can also begin to impact the students' achievements in other areas of the curriculum and can also have an impact upon the students' general functioning. Deficits in basic skill development can affect students' motivation and functioning in all aspects of their school experiences.

Preceding the passage of NCLB, Congress mandated The National Institute of Child Health and Human Development to assemble the National Reading Panel (NICHD, 2000) to review and evaluate the effectiveness of different approaches used to teach children to read. The panel conducted a meta-analysis from over 100,000 reading research studies. Because of the large number of studies, the panel reviewed only experimental and quasi-experimental studies that were considered to meet rigorous

scientific standards in its findings. The panel's review focused on the areas of phonemic awareness and phonics instruction, reading fluency, reading comprehension, teacher education, and computer technology. The findings demonstrated that phonics instruction produces significant benefits for children from kindergarten through sixth grade and for children who are struggling with reading. This stresses the importance of preventative measures and early intervention to address early literacy skills.

An aspect of NCLB is the *Reading First* program, which stresses the importance of early literacy development of students in grades K-3. Based on a review of scientifically-based reading research (Armbruster & Osborn, 2001; Burns, Alberts, & Snow, 1998; NICHHD, 2000; National Research Council, 1998), *Reading First* identified five key areas of reading instruction in which children need to develop skills in order to become proficient readers. These areas include phonemic awareness, phonics, vocabulary, reading fluency, and reading comprehension (U.S. Department of Education, 2002). In order for states to receive NCLB funds, they must show the use of research-based, scientifically validated reading instruction designed to improve literacy (Gambrell, 2004). To assist educators in meeting these legislative expectations, the utilization of appropriate methods for early identification of students who are at-risk is needed to help educators make decisions about their instruction. These legislative expectations have resulted in an increased focus on student achievement, including the ability to meet state standards and demonstrate academic proficiency. Although the current focus is on teaching academic skills, educators must also foster skills that extend beyond the academic environment.

Phonological Awareness and At-Risk Students

Phonological awareness is described as the ability to detect or manipulate sounds of oral language (Lonigan, 2006). Phonological awareness is a broad term that includes phonemic awareness. Phonemic awareness is defined as the ability to notice, think about, and manipulate the individual sounds in spoken words (Armbruster, Lehr, & Osborn, 2001). It involves the ability to understand that individual phonemes can be combined together to form words. Before children learn to read print, they must develop an awareness of how the sounds in words work (Phillips & Torgesen, 2006). For approximately 40% of children, phonological awareness does not develop naturally. There exists an estimated 18% to 20% of kindergarten and first grade students with deficits in phonemic awareness skills (National Reading Panel, 2000); these statistics help to explain the high level of interest in remediation of this skill area.

Children with phonological awareness deficits require explicit instruction to develop these skills. A breadth of research has identified the key components of early literacy development, including explicit instruction in phonological awareness and phonological processing (NICHD, 2000). Some researchers have asserted that the two best predictors of early reading success are phonemic awareness and the knowledge of the alphabetic principle (Adams, 1990; Lonigan, 2006).

Although phonemic awareness is considered a critical early literacy skill, the development of phonemic awareness does not necessarily guarantee reading success (Lyon, 1997). However, current research indicates that these skills are precursors to later reading skills, including reading decoding and comprehension (Lonigan, 2006). A meta-analysis conducted by the National Early Literacy Panel (2004) demonstrated a strong

predictive relationship between the phonological awareness of preschool or kindergarten children with later reading decoding and comprehension. Early assessment of the developmental precursors to reading is possible; this means that instruction and interventions can occur before children experience academic difficulties. The National Reading Panel (2000) asserts that systematic and explicit instruction in phonemic awareness is a direct cause of improvement in children's reading and spelling skills. These interventions may reduce the risk of later reading failure (Lonigan, 2006).

Alphabetic Principle and At-Risk Students

As previously stated, research has identified phonemic awareness and knowledge of the alphabetic principle as two of the best predictors of early reading success (Adams, 1990; Lonigan, 2006). Alphabetic principle is defined as the understanding of systematic and predictable relationships between written letters and sounds (Armbruster, Lehr, & Osborn, 2001). Also referred to as letter knowledge, this skill develops as children learn that sounds are represented by letters and that those letters can be blended to form words (i.e., phoneme-grapheme relationship). Learning letters in English requires children to be able to recognize 26 capital and 26 lower case letter shapes and make the association to letter names and sounds. Because of the variability of the English language, there are additional graphemes whose phonemes are not found in their letter names. For example, English consists of about 15 different vowel sounds, but the same sound may be spelled in different ways (e.g., /u/ in suit and boot). There is regularity to this variability which children need to learn (Ehri & Roberts, 2006).

To ensure that children acquire letter knowledge, formal instruction is required. Children who have not been exposed to a great deal of print will often struggle to identify

letters, and will have difficulty applying the alphabetic principle to reading (Casey & Howe, 2002). Children must also be taught phonological recoding in order to blend letters together and understand the systematic relationship between letters and sounds in order to read words (DIBELS, n.d.). This instruction is necessary to help develop an awareness of how written language relates to the phonological structure of oral language (Fletcher & Lyon, 1998).

Reading Fluency

The National Reading Panel report (NICHHD, 2000) defines reading fluency as the ability to read quickly, accurately, and with proper expression. Reading fluency builds upon earlier reading skills. The automaticity of skills related to phonological awareness and the alphabetic principle is essential to the development of reading (Torgesen, Rashotte, & Alexander, 2001). Phonological and alphabetic automaticity is often learned in preschool and kindergarten, with effective instruction (Torgesen, 1998). Reading fluency is related to other skills involved in reading performance, such as word analysis, word synthesis, decoding, comprehension and critical thinking (Elliott, DiPerna & Shapiro, 2001). In other words, fluency is important because it is a link between word recognition and comprehension (Pikulski & Chard, 2005).

Reading fluency may function as a key indicator of basic reading ability. Student performances in the area of reading fluency have been identified as having a strong, direct link to reading proficiency. Promoting reading fluency in students can help to develop independent, self-monitoring readers (Stayter & Allington, 1991). Fluent readers do not have to spend as much time and energy decoding words and thus are able to devote more mental effort into comprehending the text. In fact, adequate fluency is one

of the most powerful indicators regarding successful reading and obtaining meaning from text (Fuchs L., Fuchs, D. Hosp., & Jenkins, 2001). Because reading comprehension is the ultimate goal and purpose of reading (Armbuster & Osborn, 2001), the development of reading fluency skills is critical.

Assessment of Early Literacy Skills

As teachers are faced with new challenges because of the increasing demand for accountability of student achievement, the use of ongoing and appropriate assessments of student performance are necessary. The progress monitoring of students is supported by empirical research (Fuchs, Fuchs, & Hamlett, 1993). These assessments need to be used as formative evaluation methods that can provide information to identify the abilities and needs of individual students in order to customize programs to help all students achieve their potential. Repeated measurements of early literacy skills can provide instructionally relevant academic data.

A popular tool that is used for this purpose includes the Dynamic Indicators of Early Literacy Skills (DIBELS). The DIBELS not only measures pre-reading and beginning reading skills, but is also reported to be a predictor of the performance of reading success on Benchmark assessments and high-stakes tests (Good, Kaminski, Simmons & Kame'enui, 2001). The DIBELS subtests evaluate the five key areas of reading instruction that include phonemic awareness, phonics, vocabulary, reading fluency, and reading comprehension. Each individual subtest is a short (1-3 minute) fluency measure that assesses phonological awareness, knowledge of alphabetic print, and language development. These brief measures can assist educators in identifying those students who are not making adequate progress in the acquisition of reading skills

(Moats, 2003; Blom-Hoffman, Dwyer, Clarke, & Power, 2002) and provide information to inform classroom-based intervention (Kaminski & Good, 1998). This is important, given the need for early identification and intervention targeted toward developing early reading skills. Along with the call for action that has been established by NCLB, the most recent federal regulations of the Individuals with Disabilities Education Improvement Act (IDEA) of 2004 also encourages the use of scientifically-based methods for assessment, progress monitoring and intervention for at-risk students. The DIBELS assessment is used in many school systems as a tool for helping to meet student need.

It is reported that the construction and development of the DIBELS has an adequate conceptual basis, having empirical support for the relevance of the core skills which are assessed (Ehri, Nunes, Stahl, Willows, Schuster, Yaghoub-Zadeh, & Shanahan, 2001). The DIBELS has evidenced moderate to strong reliability and validity (Hintze, Ryan, & Stoner, 2003). In a study by Goffreda, DiPerna, & Pedersen (2009), the predictive validity of the DIBELS was examined by comparing first grade scores with reading proficiency scores in second and third grades. It was determined that the first grade Oral Reading Fluency (ORF) DIBELS risk category scores were the only significant predictors for future reading proficiency scores. Another 2009 study examined the predictive validity of the DIBELS for kindergarten to second grade students (Burke, Hagan-Burke, Kwok, & Parker). These results supported the validity of kindergarten DIBELS in predicting later reading skills in second grade.

Assessment of Phonological Awareness using the DIBELS

The DIBELS Phoneme Segmentation Fluency (PSF) subtest is an individually administered, standardized measure of phonological awareness. The PSF subtest

measures the student's ability to segment three and four phoneme words into individual phonemes fluently. As previously mentioned, the PSF measure has been determined to be a good predictor of later reading achievement (Kaminski & Good, 1996; Burke, Hagan-Burke, Kwok, & Parker, 2009) It is reported by the publishers that the two-week, alternate-form reliability for the PSF subtest in May of kindergarten is .88 (Kaminski & Good, 1996). For this subtest, the student is required to produce individual phonemes verbally for words that are presented by the examiner; the student has one minute to segment as many correct phonemes as possible. The PSF subtest has over 20 alternate progress monitoring forms.

Assessment of Alphabetic Principle using the DIBELS

The DIBELS Nonsense Word Fluency (NWF) subtest is an individually administered, standardized measure of the alphabetic principle, including letter-sound correspondence and the ability to blend letters into words. The NWF subtest requires the student to produce the individual letter sound verbally, or whole nonsense word from a list of randomly ordered nonwords. The purpose of the subtest is to determine if students can read unfamiliar words as whole words, not simply name letter sounds as quickly as they can.

As previously mentioned, the NWF measure has been determined to be a good predictor of later reading achievement (Kaminski & Good, 1996; Burke, Hagan-Burke, Kwok, & Parker, 2009). It has been noted that nonword measures that specifically measure phonological recoding ability are strong discriminators of reading disabilities (Rack, Snowling, & Olson, 1992). It is reported by the publishers that the one-month, alternate-form reliability for the NWF subtest in January of first grade is .83 (Kaminski &

Good, 1996). For this subtest, the student is required to verbally produce individual phonemes for words that are presented by the examiner. The student has one minute to produce as many correct letter-sounds as possible. The PSF subtest has over 20 alternate progress monitoring forms.

Both PSF and NWF are fluency-based measures of specific reading skills. A student who demonstrates academic fluency indicates that he or she has achieved the development and mastery of the specific skill. The learned skill develops to the level of automaticity and requires minimal effort or awareness of its use. The benefits of achieving fluency in a targeted skill area includes improved retention of learning, improved attention to task or resistance to distraction, and increased ability to acquire new skills (Hartnedy, Mozzoni, & Fahoum, 2005).

Summary of Related Research

Students who are self-regulated learners are active participants in their own learning. The ability for self-regulation is being recognized, increasingly, as an essential part of social development and the ability to learn in school (Howse, Calkins, Anastopoulos, Keane, & Shelton, 2003). Self-regulatory abilities are desirable, but do not always develop naturally for some children (Harris & Schmidt, 1997). There exists a need to develop self-regulation skills in students. Self-monitoring is a form of self-regulation that affects behavior and academic functioning. Self-monitoring techniques, which can help to develop self-regulation, are also considered research-based strategies. Self-monitoring techniques can be used as a targeted intervention to improve all students' learning and can be used in a variety of settings

The proposed study will extend the literature on the efficacy of self-monitoring techniques on academic skills. This study will examine archival data from an assisted self-graphing intervention for improving early literacy skills in first grade students from one elementary school. The data utilized in this study is from an early literacy progress monitoring method as a means of formative assessment to help inform teacher instruction and also allow students to self-graph their reading fluency performance. The purpose of the investigation is to examine the use of a self-graphing supplemental intervention that occurred outside of the class-wide, first grade reading instruction.

Chapter 3

Methodology

Permission to conduct the study was obtained from members of the Philadelphia College of Osteopathic Medicine Internal Review Board. Additional approval was obtained from the Director of Pupil Service of the respective district examined in the study. The data analyzed for the purpose of this study is archival data.

District & School Demographics

According to the 2009-2010 school year demographics, there are close to 12,000 students in the district. The district consists of sixteen schools with three high schools, three middle schools, and ten elementary schools. The ethnic distribution of the entire student population includes 84.5% of students who are Caucasian; 7.4% who are African American; 3.4% who are Latino; 4.6% who are Asian, and 0.1% who are Native American.

According to the 2009-2010 school year demographics, a total of 462 students attended the elementary school that was studied. The grades in this school range from kindergarten through fifth grade. Of the entire school population, 48% are males and 52% are females; 79.2% are Caucasian; 7.6% are African American; 6.9% are Latino, and 6.3% are Asian. Students who receive free and reduced lunch include approximately 13% of the population. Students who receive Learning Support Special Education services include 7.6% of the population. Students who receive Gifted Education services include 2% of the population. Students who receive regular education reading support services include 15% of the population. There are between 2% to 3% of students in each grade that receive regular education reading support services.

Participants

Participants included sixty-six students from three classes of first grade (6-8 year olds) attending a public elementary school within a large, predominately middle class, suburban school district in southeastern Pennsylvania. Of the entire first grade, 45% are males and 55% are females; 80.72% are Caucasian; 7.2% are African American; 7.2% are Asian, and 4.82% are Latino. Of the entire first grade, 2.4% of the students received reading support during the school year. None of the students was identified as students that required special education or gifted education services. One student received English as a Second Language (E.S.L.) services. The students in the intervention group represent similar demographic information when compared with the group of students at-risk for reading difficulties who did not participate in the self-graphing intervention. The students involved in this study are representative of first grade students who are enrolled in schools with similar demographic characteristics.

Participants in this study formed three groups: (1) a DIBELS Progress Monitoring and Self-Graphing Intervention group (PM + SG group), (2) a DIBELS Progress Monitoring-only group (PM group), and (3) a Non-intervention & Non-progress Monitoring group (NI group). Two subgroups from the NI group were identified for the purposes of a PSF comparison group and a NWF comparison group. The PSF and NWF comparison group performances were compared with performances of participants in the PM + SB group and the PM group on the PSF and NWF measures. All first grade parents were informed about the intervention via a letter by the building principal. All parents of participants who were identified as at-risk were informed via a phone call by a

member of the school Response to Intervention (RtI) team. All parents of participants in the PM + SG group received a copy of their child's graph at the end of the intervention period.

DIBELS Assessment

This school district utilizes the Dynamic Indicators of Basic Early Literacy Skills (DIBELS) Benchmark assessments three times a year (fall, winter, spring) as a universal screening tool at the elementary level. Each student in kindergarten through sixth grade is administered the DIBELS. The data are used to help the school-based Response to Intervention team determine which students may require remedial reading support services.

All sixty-six first grade students were administered the DIBELS Benchmark Assessment in the fall (September 2009) and the winter (December 2009) as part of the district-wide universal screening procedures. The DIBELS Benchmark Assessment in the fall comprises the Letter Naming Fluency, Phoneme Segmentation Fluency, and Nonsense Word Fluency subtests. It must be noted that a Benchmark goal is not provided for Letter Naming Fluency because it does not correspond to the "big idea" of early literacy skills (phonological awareness, alphabetic principle, and accuracy with connected text) and does not appear to be critical to achieving reading outcomes (Kaminski & Good, 2002). The DIBELS Benchmark Assessment in the winter comprises the Phoneme Segmentation Fluency, Nonsense Word Fluency, and Oral Reading Fluency subtests. Because of all sixty-six participants were administered the DIBELS Benchmark Assessment of Phoneme Segmentation Fluency and Nonsense Word

Fluency for both the fall and winter assessment periods, these scores were used as comparison measures.

First Grade DIBELS Benchmark Goals

According to the DIBELS Benchmark Goals, in the fall and winter of first grade, a student should score a 35 and above on the subtest of PSF for the skill to be considered "Established". Phonological awareness as measured by PSF is expected to be an established early literacy skill for students by the start of first grade. Scores between 10 and 34 are considered "Emerging" and scores of 9 and below are considered a "Deficit". In the fall of first grade, a student should score a 24 and above on the subtest of NWF for the skill to be considered "Low Risk". Scores between 13 and 23 are considered "Some Risk" and scores of 12 and below are considered "At Risk". In the winter of first grade, a student should score a 50 and above on the subtest of NWF for the skill to be considered "Established". Scores between 30 and 49 are considered "Emerging" and scores of 29 and below are considered a "Deficit".

The subtest of ORF is introduced only in the winter of first grade. At this time, a student should score a 20 and above for the skill to be considered "Low Risk". Scores between 8 and 19 are considered "Some Risk" and scores of 7 and below are considered "At Risk".

Group Selection Procedures

The PM + SG and PM groups of participants were identified in the fall of their first grade year as at-risk for reading failure based on the DIBELS Benchmark assessment. Students whose performance in the areas of Phoneme Segmentation Fluency (PSF) or Nonsense Word Fluency (NWF) resulted in a "status" category in the

"Emerging", "Some Risk", "At Risk" or "Deficit" categories were considered at-risk for reading failure. The established DIBELS decision rules that use longitudinal predictive data to identify Benchmark goals and outcomes for early literacy skills yield three levels of student performance status (Good, Simmons, Kame'enui, Kaminski, & Wallin, 2002). "Low Risk" or "Established" status means that approximately 80% or more students with that score would achieve the goal for that measure. "Some Risk" or "Emerging" status means that approximately 50% of students would achieve the goal for that measure. "At Risk" or "Deficit" means that 20% or fewer students would achieve the goal for that measure.

In addition to the individual indicators, the DIBELS Data System reports Instructional Recommendation categories based on the student's pattern of performance on all DIBELS Benchmark Assessments for that assessment period (Good et al., 2002). The pattern of performance is based on odds for achieving subsequent goals. There are three DIBELS Instructional Recommendation categories. The first is "Benchmark" (At Grade Level). This indicates a pattern of performance in favor of achieving subsequent DIBELS goals. Approximately 80% of students with this pattern will achieve the goal. The second category is "Strategic" (Additional Intervention). This indicates a pattern of performance that does not yield a clear prediction (i.e., 50 – 50 odds). The third category is "Intensive" (Needs Substantial Intervention). This indicates a pattern of performance with odds against achieving subsequent DIBELS goals. Approximately 20% or fewer students with this pattern will achieve the goal. For example, during the fall DIBELS Benchmark Assessment for first grade, the subsequent goals are 35+ for PSF, 50+ for NWF, and 20+ for ORF to be established by the winter of first grade. The student's

pattern of performance in these areas would yield an Instructional Recommendation based on these Benchmark criteria.

The school-based Response to Intervention (RtI) team analyzed student performance across subtests and identified those students who did not meet the Benchmark goal. It was determined that these students required more frequent progress monitoring, based on their at-risk status in the areas of PSF and/or NWF. As part of the RtI model in this school setting, the team also decided that one classroom would be provided with a self-graphing intervention as part of the progress monitoring sessions. This intervention was implemented following the fall DIBELS Benchmark Assessment (September 2009) and continued until the winter DIBELS Benchmark Assessment (December 2009). The intervention period involved a total of 15 weeks including the time of fall and winter Benchmark Assessments. Following the intervention period, the team reviewed the results and discussed the efficacy of this type of intervention for future use.

Participants in the DIBELS Progress Monitoring and Self-Graphing Intervention Group

The participants in the Progress Monitoring and Self-Graphing Intervention group (PM + SG group) were selected for the RtI intervention, based on the higher number of students from this classroom setting who were considered at-risk for reading failure when compared with the number of students in the remaining two classroom settings. Eight students (4 males and 4 females) from one classroom setting which had a total of 22 students were provided with the DIBELS Progress Monitoring and Self-Graphing Intervention in the areas of PSF and/or NWF. Six students were progress-monitored in both the PSF and NWF. Two students were progress-monitored only in PSF and two

students were progress monitored only in NWF. Of the eight students in this group, six were Caucasian; one was Asian, and one was African American. None of these eight students received free or reduced lunch. One subgroup consisting of three students (2 males and 1 female) received supplemental reading support services in addition to the intervention. These students were identified for additional reading support, based on a review of reading performance data, along with teacher input.

Participants in the DIBELS Progress Monitoring-only Group

Nine students from two classroom settings (4 males and 5 females) that had a total of 44 students in both classrooms were provided with DIBELS Progress Monitoring in the areas of PSF and/or NWF, but without the Self-Graphing Intervention. Two students were progress-monitored in both PSF and NWF. One student was progress-monitored only in PSF and six students were progress monitored only in NWF. Seven of these students were Caucasian and two were African American. Of these nine students, three received free or reduced lunch. One subgroup of six students (3 males and 3 females) received supplemental reading support services in addition to the intervention. These students were identified for additional reading support, based on a review of reading performance data along with teacher input.

Participants in the Non-intervention & Non-progress Monitoring Group

Forty-nine first grade students (22 males and 27 females) who were not selected for the self-graphing intervention or DIBELS progress monitoring composed this group. Forty-three of these students were Caucasian; five students were Asian, and one was African American. One of these 49 students received free or reduced lunch. None of these students received supplemental reading support services.

Phoneme Segmentation Fluency Comparison Subgroup

Of the forty-nine first grade students who were in the non-intervention and non-progress monitoring group, 12 students (8 males and 4 females) were identified as a comparison group in the area of PSF. Eleven of these students were Caucasian and one was Asian. None of these students received free or reduced lunch or supplemental reading support services. These students scored a 36 or below on the DIBELS Fall Benchmark assessment. The selection criterion was based on the DIBELS Benchmark for PSF. By the fall of first grade, students should score 35 or above for the skill to be considered "Established". A score of 36 and below includes students who were just outside of the range of the "Established" status and who could possibly be "at-risk".

Nonsense Word Fluency Comparison Subgroup

Of the forty-nine first grade students who were in the non-intervention and non-progress monitoring group, 11 students were identified as a comparison group in the area of NWF. Eleven of these students were Caucasian. None of these students received free or reduced lunch or supplemental reading support services. These students scored a 29 or below on the DIBELS Fall Benchmark assessment. The selection criterion was based on the DIBELS Benchmark for NWF. By the fall of first grade, students should score 24 or above for the skill to be considered "Established". A score of 29 and below includes students who were just outside of the range of the "Established" status and who could possibly be "at-risk". It should be noted that one student was a participant in both the PSF and NWF comparison groups.

Materials and Procedures

The students provided with the self-graphing intervention were tutored on how to self-graph their scores prior to the implementation of the intervention. The tutor was a selected staff member who followed a written protocol when conducting the tutoring sessions. The students were provided with repeated tutoring, as needed, if they experienced difficulties plotting their scores on the x and y axis of their graphs following the DIBELS assessment.

The staff member administering the DIBELS PSF and NWF progress monitoring assessments used the paper-and-pencil version with the students. These materials were printed from the DIBELS website (https://dibels.uoregon.edu). There are 20 versions of each of the PSF and NWF probes. The probes were administered sequentially. The students were administered the Fall and Winter DIBELS Benchmark assessment along with 5 DIBELS progress monitoring probes between the Fall and Winter Benchmark assessment. The progress monitoring data was entered into the DIBELS Data System and was also immediately provided to the teachers following each probe in an Excel spreadsheet format.

Each student in the intervention group was provided with a developmentally appropriate and high-interest graph that they selected (i.e., race car, dinosaur, rocket ship, etc.) to plot their PSF and/or NWF scores over time. An example of a student graph is provided as Figure 1. The staff member who administered the DIBELS probe and self-graphing intervention followed a script to assist with intervention adherence. The staff member calculated the student's score and the student self-graphed his or her DIBELS fluency scores immediately following the probe. The students were provided with colored

pencils when self-graphing. The students were provided with individualized feedback from the staff member while self-graphing their performances. If the students had difficulty plotting the score on the x and y axis of the graph, the staff member referred to the tutoring script to assist the student. A goal-line was included on each graph to illustrate the DIBELS fluency Benchmark criterion scores for the winter Benchmark. The graph was marked, if and when the student met the Benchmark goal. Copies of the graphs were kept in a binder that was located within the classroom setting for teacher and student reference.

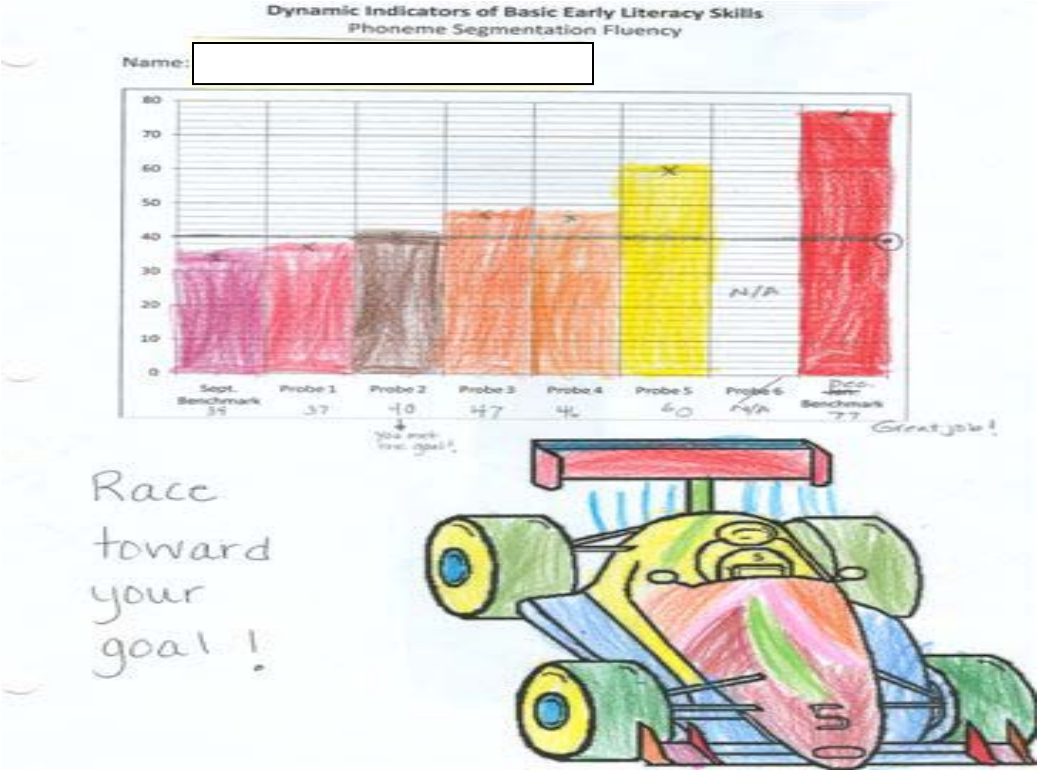

Figure 1: Example of PSF student graph

The students were progress-monitored in either PSF and/or NWF bi-weekly following the September DIBELS Benchmark Assessment until the December DIBELS Benchmark Assessment (5 progress monitoring and self-graphing sessions). At the end of the intervention period, the students and the teacher involved in the intervention were

provided with a questionnaire regarding their perceptions of the intervention. This was provided to help determine if the students felt this was an enjoyable and motivating experience. It was also provided to the teacher to help determine if the teacher felt this was an enjoyable experience, if it was a practical intervention, and if the teacher felt that it helped motivate the students.

The questionnaire was developed based on Wolf's (1978) recommendation to assess the three aspects of social validity. These aspects include the importance of the target behavior, the acceptability of the intervention, and the significance of the behavior change. Each of the eight students involved in the bi-weekly progress-monitoring and self-graphing intervention was given a 6-item questionnaire to complete anonymously. The questionnaire was composed of 6 questions (see Table 1), in which the student responded on a scale of 1 to 3, with 1 indicating the lowest acceptability (i.e., "No") and 3 indicating the highest acceptability (i.e., "Yes"). The questions were as follows: (1) Do you think it is important to read well? (2) Did you like plotting your score after the timed reading activity? (3) Did the graphs help you see how much you were improving? (4) Did you learn to read more words by doing this activity? (5) Do you think your reading is better than before you started graphing? (6) Would graphing be a good activity for teachers to use with other students?

The teacher was also given a questionnaire. This questionnaire was composed of 5 items, in which the teacher responded on a scale of 1 (low acceptability) to 4 (high acceptability), as well as an opportunity to include additional comments. The items were as follows: (1) The assisted self-graphing intervention appeared easy to implement; (2) The assisted self-graphing intervention had positive effects on your students' reading

fluency; (3) The assisted self-graphing intervention had positive effects on your students' overall reading skills; (4) The students seemed to enjoy the assisted self-graphing intervention. (5) You would use this assisted self-graphing intervention in the future.

In addition to the student and teacher questionnaires, the two first grade classroom teachers who were not involved in the self-graphing intervention were interviewed following the intervention period. These post-intervention interviews were conducted for the purpose of collecting additional data to assist with RtI team decisions regarding the future use of this type of intervention.

Design & Data Analysis

This study utilized a pre-test and post-test design (DIBELS Fall Benchmark and DIBELS Winter Benchmark). The "at-risk" participants in this study were administered bi-weekly DIBELS progress monitoring in PSF and/or NWF between the Benchmark assessments. Percentages of growth scores and Rates of Improvement (ROI) scores were calculated for students using the pre-test (Fall) and post-test (Winter) DIBELS assessment results. The ratio of deficiency scores using ROI scores was also calculated. Post-intervention Likert Scale questionnaires were provided to the students and teacher in the PM + SG group.

Percentages of growth scores reflect the amount of change over a period of time. These scores were calculated by subtracting the pre-test score (DIBELS Fall Benchmark) from the post-test score (DIBELS Winter Benchmark), dividing by the pre-test score and then converting to a percentage by multiplying by 100.

The Rate of Improvement (ROI) can be used to set the criterion against the group of students being compared. It involves calculating slope and making a comparison to an

expected rate of change or improvement. Slope is calculated by taking the last score and subtracting it from the first score and then dividing by the number of weeks between scores. Once the ROI is calculated, one can compare this to normative ROI's. If available, one can use district or local ROI's. There are also national ROI's that are available through published data and through progress-monitoring and RtI data management systems such as AIMSweb (Pearson, Education, Inc., 2010). When the student demonstrates an ROI that exceeds what is typically expected, this indicates that the current instruction is helping the student to progress at an ideal rate (Shapiro & Clemens, 2009). According to Nellis (2009), one can calculate a ratio of deficiency by dividing the expected ROI by the obtained ROI. If the ratio of deficiency is greater than 2.0, this is considered a concern.

When using the DIBELS Benchmark assessment, the ROI is calculated for students between Benchmarks and/or for the entire year. For first grade students, one is able to calculate DIBELS ROI for NWF and ORF. It is not recommended to calculate ROI for PSF because this skill is supposed to be established prior to first grade (PATTAN, 2008). As an example, a first grade student who begins the year at Benchmark in NWF by scoring 24 and then meets the Winter Benchmark at 50, would achieve a gain of 26 letter-sounds in the weeks between the Fall and Winter DIBELS Benchmark assessment. As part of this study, there were 15 weeks between the Fall and Winter DIBELS Benchmark assessment for first graders. Therefore, a first grade student that met the Benchmark goal for the Fall and the Winter and gained 26 letter sounds would demonstrate an ROI of 1.73 letter-sounds per week (26 letter sounds divided by 15 weeks). It should be noted that students below Benchmark levels must demonstrate

higher levels of ROI than the student at Benchmark level in order to meet the subsequent DIBELS goal (Shapiro, 2008).

Ethical Considerations

Based on the literature review related to the efficacy of self-monitoring techniques to improve academic skills, very few potential ethical considerations emerged. Past research in this area has utilized typical ethical practices, including approval by Human Subjects Institutional Review Boards, use of appropriate methods for obtaining informed parental consent, and methods used to protect the welfare and confidentiality of the participants involved. The appropriate ethical practices were followed for the current study.

Unlike many previous studies, this study would involve students at- risk for reading difficulties from an entire grade level of students. It would not include or exclude anyone based on demographics or educational label, which may have ethical advantages. However, one must consider the ethical implications for the group of students who do not receive the intervention. If the intervention is found to be beneficial for the intervention group, it is difficult to justify withholding the intervention from the other at-risk students. This practice is necessary in order to make statistical comparisons between groups. Based upon the findings, it may be beneficial to offer this intervention to the other group of first grade students who are considered at-risk in reading.

Multicultural Considerations

The literacy achievement of minority students has been an established concern prior to NCLB (2001). Studies dating back to the 1960s indicate that minority groups including Black, Hispanic, and Native American students across socioeconomic levels do

not perform as well on standardized tests as Caucasian and Asian American students (The College Board, 1999). There has been an increase over time in the percentage of public school students who are considered to be part of a racial or ethnic minority group. The National Center for Educational Statistics (NCES) reports an increase in minority population from 22 percent in 1972 to 43 percent in 2006 (NCES, 2006). The increase in this specific population suggests an increase in the number of students who do not perform as well on standardized assessments.

These findings have important implications for teachers and for school districts. Au (2005) stresses the importance of ensuring that students from diverse backgrounds become proficient in reading. Diverse backgrounds are explained as differing from the majority in terms of ethnicity, socioeconomic status and primary language. The historical data regarding the achievement gap between Caucasian students and Black, Hispanic, and Native American students along with additional multicultural and diversity issues must be considered when addressing the literacy development of students.

Although this study does not focus solely on minority students, it does include at-risk students from an entire first grade class which is composed of a representative sample of the minority students that attend this suburban school setting. If consistent, positive results are found across subjects, this has the potential to increase the generalizability to all students regardless of minority status. This could prove to be a helpful intervention to help develop student regulation ability and target early literacy skills for all students.

Summary

The purpose of this study is to investigate archival data to evaluate the effectiveness of using assisted self-graphing following DIBELS progress-monitoring in the areas of Phoneme Segmentation Fluency and Nonsense Word Fluency with a group of first grade students at- risk for reading difficulties. The research study will analyze data to determine if the use of self-graphing produced significant increases in the students' Phoneme Segmentation Fluency and Nonsense Word Fluency performances. It will also examine survey data to determine if the students and teachers involved in the self-graphing intervention reported positive outcomes as a part of their participation.

Chapter 4

Results

This research study utilized archival reading data obtained from a first grade population from one elementary school in a large, suburban district. All students received pre- (September 2009) and post- (December 2009) assessments from the DIBELS Benchmark Assessment in the areas of Phoneme Segmentation Fluency (PSF) and Nonsense Word Fluency (NWF). This research employed quantitative analyses including basic descriptive statistical procedures. Descriptive statistics were used to help answer the research questions by comparing the three participant groups.

The three participant groups included the bi-weekly progress-monitoring and self-graphing participants (PM+ SG group), the bi-weekly progress-monitoring only participants (PM group), and the non-intervention and non-progress monitoring (NI group) comparison groups. Each student was assigned a "Student Number" for the purposes of the research study (see Table 1). The NI comparison group performances were compared with performances of participants in the PM + SB group and the PM group on the PSF and NWF measures. This comparison will determine if there was improvement in reading fluency performance with the PM + SG group and if there were differences in reading fluency performances between groups. Questionnaire results will determine if students and teacher indicate positive perceptions of the intervention.

Table 1

Participant Groups and Assigned Student Numbers

Group	**Student Numbers**
PM + SG	1 – 8
PM	9 – 17
NI	18 – 66
NI PSF Comparison	19, 21, 23, 25, 28, 29, 30, 40, 43, 57, 65
NI NWF Comparison	18, 19, 20, 33, 34, 35, 49, 50, 51, 52, 53

Research Question 1

Will the use of a self-monitoring intervention help to improve academic skill production in the area of reading fluency?

Pre and post-test DIBELS Benchmark Assessments in the areas of PSF and NWF were conducted and the percentages of growth rates were analyzed to assess individual improvements in reading fluency in the areas of PSF and NWF. Between the pre-assessment (September 2009) and the post-assessment (December 2009), the students that were identified as "at-risk readers" in the PM + SG group were provided with bi-weekly DIBELS progress-monitoring sessions for PSF and/or NWF along with the self-graphing intervention. As a reference, Table 2 provides information regarding the DIBELS Benchmark Goals for first grade. Student performance data that indicated a status of "Deficit", "Emerging", "At Risk" or "Some Risk" were considered by the school-based RtI team as an "at- risk reader".

Table 2

DIBELS First Grade Benchmark Goals

	Fall		**Winter**		**Spring**	
	Scores	***Status***	***Scores***	***Status***	***Scores***	***Status***
PSF	0-9	Deficit	0-9	Deficit	0-9	Deficit
	10-34	Emerging	10-34	Emerging	10-34	Emerging
	35 +	Established	35 +	Established	35 +	Established
NWF	0-12	At Risk	0-29	Deficit	0-29	Deficit
	13-23	Some Risk	30-49	Emerging	30-49	Emerging
	24 +	Low Risk	50 +	Established	50 +	Established
ORF	Not administered		0-7	At Risk	0-19	At Risk
			8-19	Some Risk	20-39	Some Risk
			20 +	Low Risk	40 +	Low Risk

(Good, Simmons, Kame'enui, Kaminski, & Wallin, 2002).

Phoneme Segmentation Fluency for PM + SG Group

Table 3 includes the PM + SG group pre- and post-assessment PSF DIBELS results, DIBELS status, and percentage of growth from the pre- to the post-assessment. A comparison of the DIBELS PSF September Benchmark with the DIBELS December Benchmark indicated that all students demonstrated a positive percentage of growth. The smallest percentage of growth was seen for student number 1 (21%) and student number 3 (28%). It is important to note that these students were not provided with the bi-weekly progress- monitoring and self-graphing for PSF because this area was not determined to be "at- risk" following the September Benchmark assessment. The remaining six students who were provided with bi-weekly progress-monitoring and self-graphing for PSF demonstrated percentage of change rates that ranged from 45% to 260%. The highest percentage of growth was seen for student number 7 (260%). The status of these eight students progressed from five students being considered "Emerging" at the September Benchmark Assessment to all eight students being in the "Established" range by the December Benchmark assessment.

Table 3

DIBELS PSF Results for PM + SG Group

Student	Pre-Test		Post-Test		
	September Score	Status	December Score	Status	Percent Growth
1	43	Established	52	Established	21
2	15	Emerging	50	Established	233
3	40	Established	51	Established	28
4	33	Emerging	48	Established	45
5	36	Established	58	Established	61
6	34	Emerging	77	Established	126
7	15	Emerging	54	Established	260
8	33	Emerging	58	Established	76

Note. Student numbers 1 and 3 were not provided with bi-weekly progress monitoring in PSF. These students only received bi-weekly progress monitoring in NWF.

The six students in the PM + SG group who were monitored in the area of PSF made good progress in meeting the Benchmark goal (35 phonemes per minute). Table 4 provides details regarding these students' progress during the intervention period. It must be noted that student number 5 was progress-monitored and this student had already met the Benchmark goal (36 phonemes), but because this student was on the cusp of Benchmark and was identified by the RtI team as being "at- risk" for falling below Benchmark in PSF, it was recommended that the student receive the intervention. This student was able to maintain the Benchmark performance throughout the intervention period. Two of the students met the goal during the second progress monitoring and self-graphing session (students number 6 and 8). Student number 6 was able to maintain the Benchmark performance throughout the intervention period and in fact ended by making excellent growth in PSF. This student's PSF score went from 34 to 77 (126 percentage of growth). Student number 8 fell just below the Benchmark during the third session, but then was able to maintain Benchmark performance for the remainder of the intervention

period. Student number 2 met and maintained Benchmark performance as of the third session. Student number 4 met and maintained Benchmark performance as of the fourth session. Finally, student 7 met and maintained Benchmark performance as of the fifth session. This student made the biggest gains in PSF with a 260 percentage of growth (15 phonemes to 54 phonemes per minute).

Table 4

DIBELS PSF Bi-Weekly Performance for PM + SG Group

Student	September Benchmark	Probe 1	Probe 2	Probe 3	Probe 4	Probe 5	December Benchmark
2	15	25	36	45	46	43	50
4	33	32	33	49	51	53	48
5	36	38	40	42	45	49	58
6	34	37	40	47	46	60	77
7	15	16	12	30	43	49	54
8	33	36	34	54	45	55	58

Note. PSF Benchmark is 35 for Fall and Winter of First Grade.

Nonsense Word Fluency for PM + SG Group

Table 5 presents the PM + SG group pre- and post-assessment NWF DIBELS results, DIBELS status, and percentage of growth from the pre- to the post-assessment. A comparison of the DIBELS NWF September Benchmark with the DIBELS December Benchmark indicated that all students demonstrated a positive percentage of change. The smallest percentage of change was seen for student number 7 (26%). It is important to note that this student was not provided with the bi-weekly progress-monitoring and self-graphing for NWF because this area was not determined to be "at risk" following the September Benchmark assessment. This student's NWF status following the December Benchmark assessment was "Deficit". The other student in this group who was not provided with the bi-weekly progress monitoring and self-graphing was student number 8. This student's percentage of change was 88%; this status is considered "Established". The remaining six students who were provided with bi-weekly progress monitoring and

self-graphing for NWF demonstrated percentage of change rates that ranged from 63% to 246%. The student with the highest percentage of growth was student number 1 (246%). Following the September Benchmark Assessment, six of the students were considered "Some Risk" status. Following the December Benchmark Assessment, three of the six students demonstrated performances on NWF that were considered "Emerging" and three students' performances on NWF were considered "Established".

Table 5

DIBELS NWF Results for PM + SG Group

Student	Pre-Test		Post-Test		Percentage Growth
	September Score	Status	December Score	Status	
1	13	Some Risk	45	Emerging	246
2	16	Some Risk	41	Emerging	156
3	19	Some Risk	31	Emerging	63
4	20	Some Risk	69	Established	245
5	20	Some Risk	68	Established	240
6	21	Some Risk	69	Established	229
7	23	Low Risk	29	Deficit	26
8	32	Low Risk	60	Established	88

Note. Student numbers 7 and 8 were not provided with bi-weekly progress monitoring in NWF. These students received only bi-weekly progress monitoring in PSF.

All of the six students from the PM + SG group who were monitored in the area of NWF made progress in meeting the Benchmark goal for the winter assessment (50 letter-sounds per minute). Table 6 provides details regarding these students' progress during the intervention period. Three of the six students met or exceeded the Benchmark goal by December. Student number 4 met the Benchmark goal more quickly than the rest. This student met the goal by the third progress monitoring and self-graphing session and was able to maintain Benchmark performance for the remainder of the intervention period. Student number 6 met and maintained the goal by the fourth session. Student

number 5 met the goal by the sixth session and maintained Benchmark status with Winter Benchmark that followed. All three of these students demonstrated high levels of growth, ranging from 229 to 240 from the Fall to Winter Benchmark Assessments. It must be noted that although students identified as numbers 1 and 2 did not meet the Winter Benchmark goal, both of these students also demonstrated high levels of growth, ranging from 156 to 246 from Fall to Winter.

Table 6

DIBELS NWF Bi-Weekly Performance for PM + SG Group

Student	September Benchmark	Probe 1	Probe 2	Probe 3	Probe 4	Probe 5	December Benchmark
1	13	31	34	31	32	40	45
2	16	16	20	29	30	37	41
3	19	25	26	26	23	28	31
4	20	33	56	56	63	71	69
5	20	22	36	42	48	58	68
6	21	43	47	65	58	67	69

Note. NWF Benchmark is 24 for Fall and 50 for Winter of First Grade.

Research Question 2

Will there be a difference in academic skill production when comparing students who received a self-monitoring intervention with students who did not receive a self-monitoring intervention?

Phoneme Segmentation Fluency Comparison

A comparison of fluency scores in PSF between students in the PM + SG group, students in the PM group, and students in the NI comparison group for PSF were used to help determine if there were differences in academic skill production. It must be noted that only students in the PM + SG and PM groups that were progress-monitored in PSF are included as part of these comparisons. Figure 2 presents the DIBELS PSF September and December Benchmark scores across participants. Table 8 presents these scores as

well and also includes DIBELS status categories, and percentage of growth for each student.

The DIBELS PSF Benchmark goal is for students to have established phonological awareness skills by scoring a minimum of 35 on PSF by the end of kindergarten or the beginning of first grade. This indicates that the student is able to segment most 3 to 5 phoneme words into their component phonemes (Shapiro, 2008). The Benchmark goal of at least 35 phonemes per minute is maintained for the Winter assessment of first grade. The data from the PM + SG group indicates that five of the six students demonstrated performance on PSF that was considered "Emerging" in September. The PSF scores for the PM + SG group ranged from 15 to 36 in September. Following the December Benchmark assessment, all of the six students' performances on PSF was considered "Established" and had met or exceeded the Benchmark goal of 35 phonemes per minute (100% of PM + SG group met Benchmark). The PSF scores for the PM + SG group ranged from 48 to 77 in December. Five out of six of these students scored above 50 on the December Benchmark assessment. As presented in Table 4, all of the six students in the PM + SG group who were provided with bi-weekly progress-monitoring and self-graphing demonstrated positive rates of growth in the area of PSF from the September DIBELS Benchmark assessment to the December DIBELS Benchmark assessment. These rates ranged from 45 (student number 4) to 260 (student number 7) percentages of growth for this group.

The data from the PM group indicates that all three of these students demonstrated performance on PSF that was considered "Emerging" in September. The PSF scores for the PM group ranged from 13 to 33 in September. Following the

December Benchmark assessment, all three students' performances on PSF was considered "Established" and had met or had exceeded the Benchmark goal of 35 phonemes per minute (100% of PM group met Benchmark). The PSF scores for the PM group ranged from 45 to 62 in December. One out of three of these students scored above 50 on the December Benchmark assessment. As presented in Table 8, all of the three students in the PM group who were provided with only bi-weekly progress-monitoring demonstrated positive rates of growth from the September DIBELS Benchmark assessment to the December DIBELS Benchmark assessment. These rates ranged from 94 (student number 14) to 246 (student number 17) percentages of growth for this group.

Table 7 provides details regarding the PM students' progress during the intervention period. Two of the students met the goal during the third progress monitoring and self-graphing session (students, numbers 14 and 17). These students were able to maintain Benchmark status for the remainder of the progress-monitoring sessions. Student number 17 demonstrated the greatest amount of growth for this group by going from 13 to 45 phonemes per minute (246 percentage of growth). Student number 13 met and maintained Benchmark performance by the fourth session.

Table 7

DIBELS PSF Bi-Weekly Performance for PM Group

Student	September Benchmark	Probe 1	Probe 2	Probe 3	Probe 4	Probe 5	December Benchmark
13	21	27	28	38	44	44	45
14	32	34	38	50	52	55	62
17	13	22	45	50	36	44	45

Note. PSF Benchmark is 35 for Fall and Winter of First Grade.

The data from the NI comparison group for PSF indicates that in September, one student demonstrated performance on PSF that was considered "Deficit"; six students demonstrated performances that were considered "Emerging", and five students demonstrated performances that were considered "Established". The PSF scores for the NI comparison group ranged from 8 to 36 in September. Following the December Benchmark assessment, eleven students' performances on PSF were considered "Established" and met or exceeded the Benchmark goal. One student's performance was considered "Emerging" and did not meet the Benchmark goal (92% of NI group met Benchmark). As presented in Table 8, the PSF scores for NI comparison group ranged from 26 to 53 following the December Benchmark assessment. Two of the twelve students scored above 50 on the December assessment. The twelve students in the NI comparison group for PSF demonstrated positive rates of growth from the September DIBELS Benchmark assessment to the December DIBELS Benchmark assessment. These rates ranged from 6 (student number 19) to 225 (student number 25) percentages of growth for this group.

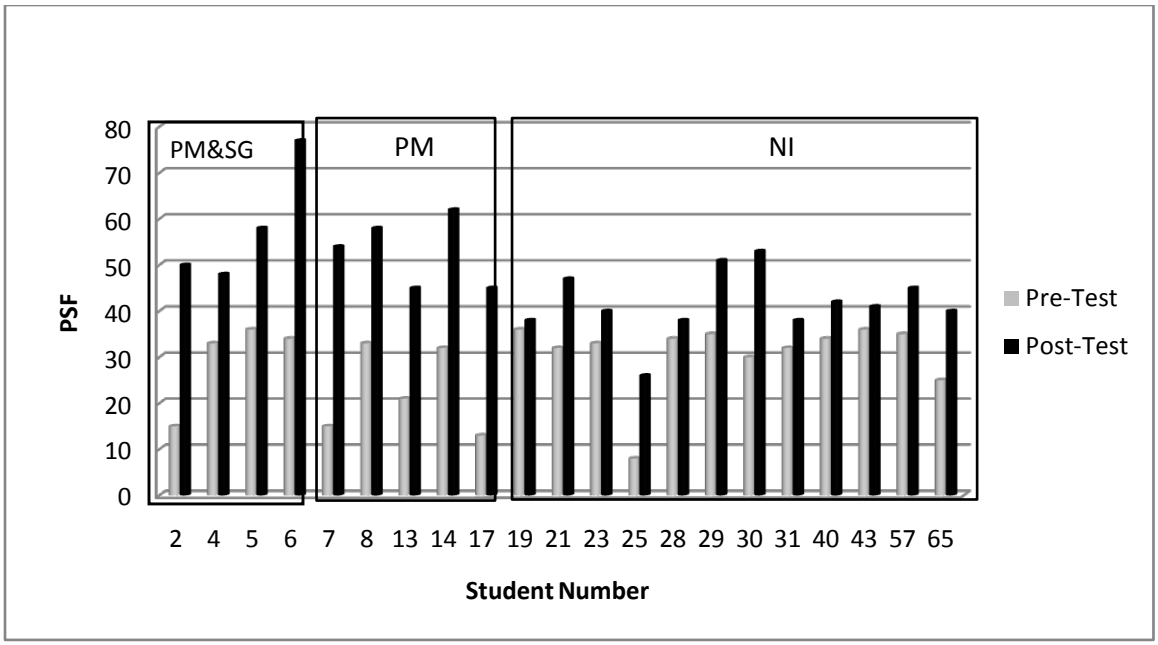

Figure 2: DIBELS PSF Benchmark scores across participants

Note. PM + SG = Student Numbers 2 -8 ; PM = Student Numbers 13-17; NI = Student Numbers 19 – 65.

Table 8

DIBELS PSF Results across Groups

Student	Group	Pre-Test		Post-Test		Percent Growth
		September Score	Status	December Score	Status	
2	PM + SG	15	Emerging	50	Established	233
4	PM + SG	33	Emerging	48	Established	45
5	PM + SG	36	Established	58	Established	61
6	PM + SG	34	Emerging	77	Established	126
7	PM + SG	15	Emerging	54	Established	260
8	PM + SG	33	Emerging	58	Established	76
13	PM	21	Emerging	45	Established	114
14	PM	32	Emerging	62	Established	94
17	PM	13	Emerging	45	Established	246
19	NI	36	Established	38	Established	6
21	NI	32	Emerging	47	Established	47
23	NI	33	Emerging	40	Established	21
25	NI	8	Deficit	26	Emerging	225
28	NI	34	Emerging	38	Established	12
29	NI	35	Established	51	Established	46
30	NI	30	Established	53	Established	77
31	NI	32	Emerging	38	Established	19
40	NI	34	Emerging	42	Established	24
43	NI	36	Established	41	Established	14
57	NI	35	Established	45	Established	29
65	NI	25	Emerging	40	Established	60

All six students in the PM + SG group and all three students in the PM group met the PSF Benchmark goal by the Winter DIBELS Benchmark Assessment. When comparing the PM + SG group with the PM group regarding rate of achieving Benchmark goals for PSF, it appears that, on average, the students from both groups met the Benchmark status between the third and fourth sessions. Table 9 provides data for comparison purposes. It must be noted that student number 5 had already met the Fall Benchmark, but was considered an "at- risk reader" and was recommended for the intervention. Excluding this student's rate of reaching the Benchmark status, the students in the PM + SG group reached the Benchmark status, on average, by session 3.2. On

average, the students from the PM group met the Benchmark goal by session 3.3. This type of data is not available to assist in comparisons with the NI group because these students were adminsitered only the Fall and Winter DIBELS Benchmark assessments and were not provided with bi-weekly progress monitoring.

Table 9

DIBELS PSF Benchmark Rate Comparison for PM + SG and PM Groups

Student	Group	Session Met Benchmark
2	PM + SG	3
4	PM + SG	4
5	PM + SG	1
6	PM + SG	2
7	PM + SG	5
8	PM + SG	2
13	PM	4
14	PM	3
17	PM	3

Note. Student number 5 had met the Fall Benchmark, but was considered an "at-risk reader" and recommended for the intervention.

Nonsense Word Fluency Comparison

A comparison of fluency scores in NWF between students in the PM + SG group, students in the PM group, and students in the NI comparison group for NWF were used to help determine if there were differences in academic skill production. It must be noted that only students in the PM + SG and PM groups that were progress-monitored in NWF are included as part of these comparisons. Figure 3 presents the DIBELS NWF September and December Benchmark scores across participants. Table 11 presents these scores as well and also includes DIBELS status categories, percentage of growth for each student, and Rate of Improvement (ROI).

The DIBELS NWF Benchmark goal by the Fall of first grade is at least 24 letter-sounds per minute. The NWF Benchmark goal of at least 50 letter-sounds per minute is established for the Winter assessment. The data from the PM + SG group indicates that

all six students demonstrated performances on NWF that was considered "Some Risk" in September. The NWF scores for the PM + SG group ranged from 13 to 21 in September. Following the December Benchmark assessment, three of the students' performances on NWF was considered "Emerging" and three of the students' peformances was considered "Established". The December NWF scores ranged from 31 to 69 with three of six of these students scoring above 60. As presented in Table 5, three of the six students in the PM + SG group met or exceeded the December Benchmark (50% of the PM + SG group). All six students who were provided with bi-weekly progress monitoring and self-graphing demonstrated positive rates of growth in the area of NWF from the September DIBELS Benchmark assessment to the December DIBELS Benchmark assessment. These rates ranged from 63 (student number 3) to 246 (student number 1) percentages of growth for this group.

The data from the PM group indicates that one of the eight students demonstrated performance on NWF that was considered "At-Risk" in September with the remaining seven students' peformances falling in the "Some Risk" category. The NWF for the PM group ranged from 11 to 23 in September. Following the December Benchmark assessment, five students' performances on PSF was considered "Emerging" with three students' peformances considered "Established". The December NWF scores ranged from 32 to 61 with one of the eight students scoring above 60. Three of the eight students in the PM group met the December Benchmark (38% of the PM group). All of the eight students who were provided with bi-weekly progress- monitoring demonstrated positive rates of growth from the September DIBELS Benchmark assessment to the

December DIBELS Benchmark assessment. These rates ranged from 39 (student number 11) to 273 (student number 9) percentages of growth for this group.

Table 10 provides details regarding the PM students' progress during the intervention period. Four of the eight students met the NWF goal during the intervention period. Student number 15 met the Benchmark goal by session 4; however, this student was not able to maintain Benchmark performance and the Winter Benchmark score fell to 37. Student number 17 met the Benchmark goal by session 5 and was able to maintain Benchmark performance for the remainder of the intervention period. Student number 14 met the Benchmark goal by session 6 and was able to maintain Benchmark performance for the Winter Benchmark that followed. Student number 16 met the Benchmark goal at the Winter Benchmark Assessment.

Table 10

DIBELS NWF Bi-Weekly Performance for PM Group

Student	September Benchmark	Probe 1	Probe 2	Probe 3	Probe 4	Probe 5	December Benchmark
9	11	19	25	21	41	35	41
10	22	42	35	35	32	32	40
11	23	12	23	20	27	30	32
12	23	29	40	32	41	56	44
14	19	25	27	29	35	56	54
15	20	36	44	51	56	61	37
16	22	24	34	30	33	41	54
17	23	32	41	40	52	61	61

Note. NWF Benchmark is 24 for Fall and 50 for Winter of First Grade.

The data from eleven students in the NI comparison group for NWF indicates that in September, one student demonstrated performance on NWF that was considered "Some Risk" and ten students demonstrated performance that was considered "Low Risk". The NWF for the NI group ranged from 23 to 29 in September. Following the December Benchmark assessment, five students' performances on NWF was considered "Emerging" with six students' performances considered "Established". Six of the eleven

students in the NI comparison group met the December Benchmark (55% of the NI group). The December NWF scores ranged from 35 to 64 with two of the eleven students scoring above 60. All eleven students in the NI comparison group for NWF demonstrated positive rates of growth from the September DIBELS Benchmark assessment to the December DIBELS Benchmark assessment. These rates ranged from11 to 167 percentages of growth for this group.

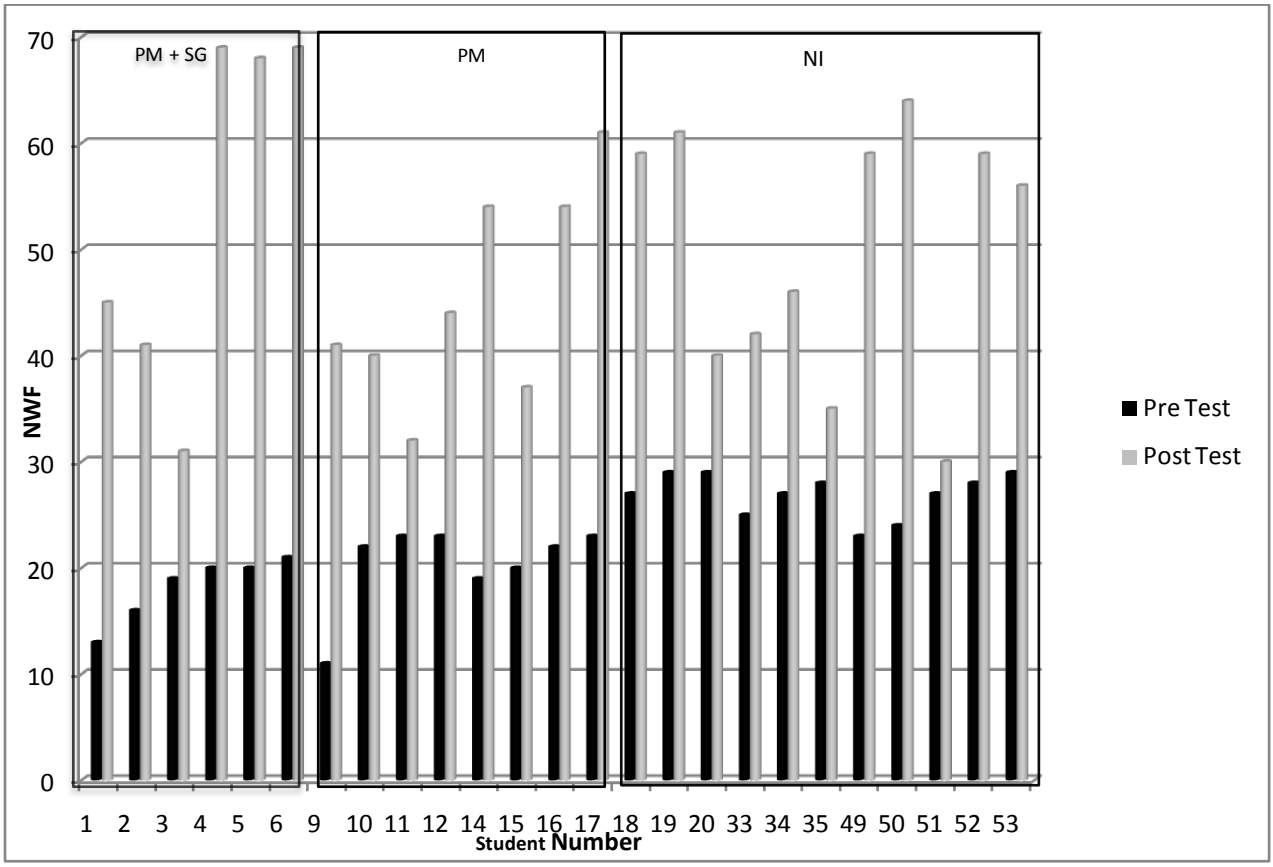

Figure 3: DIBELS NWF Benchmark scores across participants

Note. PM + SG = Student Numbers 1 - 6 ; PM = Student Numbers 9 - 17; NI = Student Numbers 18 – 53.

Table 11

DIBELS NWF Results across Groups

Student	Group	Pre-Test		Post-Test				
		September Score	Status	December Score	Status	Percent Growth	ROI	Ratio of Deficiency
1	PM + SG	13	Some Risk	45	Emerging	246	2.13	.81
2	PM + SG	16	Some Risk	41	Emerging	156	1.67	1.04
3	PM + SG	19	Some Risk	31	Emerging	63	.80	2.16
4	PM + SG	20	Some Risk	69	Established	245	3.27	.53
5	PM + SG	20	Some Risk	68	Established	240	3.20	.54
6	PM + SG	21	Some Risk	69	Established	229	3.20	.54
9	PM	11	At Risk	41	Emerging	273	2.00	.87
10	PM	22	Some Risk	40	Emerging	208	1.20	1.44
11	PM	23	Some Risk	32	Emerging	39	.60	2.88
12	PM	23	Some Risk	44	Emerging	91	1.40	1.24
14	PM	19	Some Risk	54	Established	184	2.30	.75
15	PM	20	Some Risk	37	Emerging	85	1.13	1.53
16	PM	22	Some Risk	54	Established	145	2.13	.81
17	PM	23	Some Risk	61	Established	165	2.53	.68
18	NI	27	Low Risk	59	Established	119	2.13	.81
19	NI	29	Low Risk	61	Established	110	2.13	.81
20	NI	29	Low Risk	40	Emerging	38	.73	2.37
33	NI	25	Low Risk	42	Emerging	68	1.13	1.53
34	NI	27	Low Risk	46	Emerging	70	1.27	1.36
35	NI	28	Low Risk	35	Emerging	25	.47	3.68
49	NI	23	Some Risk	59	Established	157	2.40	.72
50	NI	24	Low Risk	64	Established	167	2.67	.65
51	NI	27	Low Risk	30	Emerging	11	.20	8.65
52	NI	28	Low Risk	59	Established	111	2.07	.84
53	NI	29	Low Risk	56	Established	93	1.80	.96

Three of six students in the PM + SG group and four of eight students in the PM group met the NWF Benchmark goal by the Winter DIBELS Benchmark Assessment. Table 12 provides data for comparison purposes. When comparing the PM + SG group with the PM group regarding rate of achieving Benchmark goals for NWF, it appears that the students from the PM + SG group who were able to meet the Benchmark goal did so at a slightly faster rate. On average, these students met the Benchmark goal between sessions 4 and 5 (session 4.3). All three of these students in the PM + SG group were

able to maintain the Benchmark status during the intervention period. On average, the four students in the PM group who were able to meet the Benchmark goal did so between sessions 5 and 6 (session 5.5). However, one of these students was not able to maintain the Benchmark status over the entire intervention period. This type of data is not available to assist in comparisons with the NI group because these students were administered only the Fall and Winter DIBELS Benchmark assessments and were not provided with bi-weekly progress monitoring.

Table 12

DIBELS NWF Benchmark Rate Comparison for PM + SG and PM Groups

Student	Group	Session Met Benchmark
1	PM + SG	Did not meet benchmark
2	PM + SG	Did not meet benchmark
3	PM + SG	Did not meet benchmark
4	PM + SG	3
5	PM + SG	6
6	PM + SG	4
9	PM	Did not meet benchmark
10	PM	Did not meet benchmark
11	PM	Did not meet benchmark
12	PM	Did not meet benchmark
14	PM	6
15	PM	4
16	PM	7
17	PM	5

DIBELS ROI

The Rate of Improvement (ROI) can be used to set the criterion against the group of students being compared. It involves calculating slope and making a comparison with an expected rate of change or improvement. Slope is calculated by taking the last score and subtracting it from the first score and then dividing by the number of weeks between scores. Once the ROI is calculated, one can compare this to normative ROI's. If available, one can use district or local ROI's. There are also national ROI's that are available through published data and through progress monitoring and RtI data

management systems such as AIMSweb (Pearson, Education, Inc., 2010). The student who demonstrates a ROI that exceeds what is typically expected indicates that the current instruction is helping the student to progress at an ideal rate (Shapiro & Clemens, 2009). According to Nellis (2009), one can calculate a ratio of deficiency by dividing the expected ROI by the obtained ROI. If the ratio of deficiency is greater than 2.0, this is considered a concern.

When using the DIBELS Benchmark assessment, the ROI is calculated for students between Benchmarks and/or for the entire year. For first grade students, one is able to calculate DIBELS ROI for NWF and ORF. It is not recommended to calculate ROI for PSF because this skill is supposed to be established prior to first grade (PATTAN, 2008). As an example, a first grade student who begins the year at Benchmark in NWF by scoring 24 and then meets the Winter Benchmark at 50, would achieve a gain of 26 letter-sounds in the weeks between the Fall and Winter DIBELS Benchmark assessment. As part of this study, there were 15 weeks between the Fall and Winter DIBELS Benchmark assessment for first graders. Therefore, a first grade student that met the Benchmark goal for the Fall and the Winter and gained 26 letter sounds would demonstrate an ROI of 1.73 letter-sounds per week (26 letter sounds divided by 15 weeks). It should be noted that students below Benchmark levels must demonstrate higher levels of ROI than the student at Benchmark level in order to meet the subsequent DIBELS goal (Shapiro, 2008).

Using the ROI formula, ROI rates and ratio of deficiency scores were calculated for the students in the PM + SG group, the PM group, and the NI comparison group for NWF (see Table 11 & Figure 4). Given the Benchmark ROI of 1.73 letter-sounds per

week for NWF for first grade, a comparison can be made with the student performances in the three participant groups. As noted, the students who were determined to be below Benchmark ("At Risk" or "Some Risk") following the Fall Benchmark should demonstrate an ROI above 1.73 in order to make enough gains to meet the subsequent Benchmark goal. Using this ROI criterion, it was determined that two of the six students in the PM + SG group were below the criterion (33% of the group). The ROI rates for the PM + SG group ranged from .80 for student number 3 to 3.27 for student number 4. Using the ratio of deficiency formula, student number 3's ROI is considered a concern. In addition to making individual student comparisons, the ROI of the group can be calculated for comparative purposes. The ROI for the PM + SG group is 2.38, which is above the criterion of 1.73.

Four of the eight students in the PM group were below the criterion of 1.73 (50% of the group). The ROI rates for the PM group ranged from .60 for student number 11 to 2.53 for student number 17. Using the ratio of deficiency formula, student number 11's ROI is considered a concern. The ROI for the PM group is 1.66, which is below the criterion of 1.73.

Finally, five of the eleven students in the NI comparison group for NWF were below the criterion (45% of the group). The ROI rates for the NI group ranged from .47 for student number 35 to 2.67 for student number 50. Using the ratio of deficiency formula, the ROI for students numbered 20, 35, and 51 were considered a concern. The ROI for the NI group is 1.55, which is the lowest ROI of the three groups and is also below the criterion of 1.73.

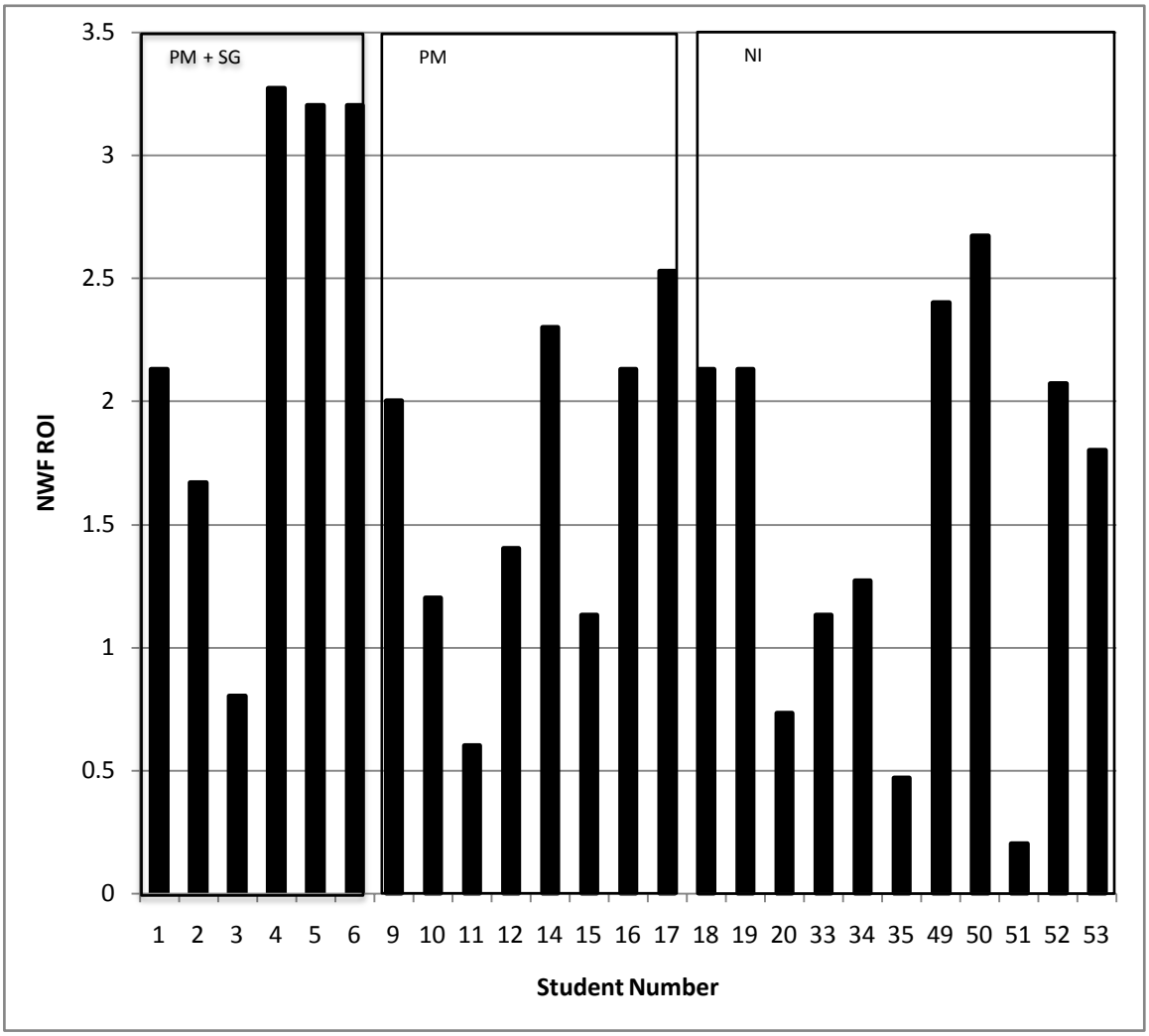

Figure 4: DIBELS NWF ROI scores across participants

Note. PM + SG = Student Numbers 1 - 6 ; PM = Student Numbers 9 - 17; NI = Student Numbers 18 – 53.

Research Question 3

Will students and teacher questionnaires result in positive perceptions of the self-monitoring intervention?

The results of the student questionnaire indicated that all eight students who received the self-monitoring intervention (PM + SG group) selected the highest level of

acceptability (3 or "Yes") for four of the six items (see Table 13). There were two items in which one of the eight students indicated low acceptability (1 or "No'). These items assessed if the graphs helped the student see how much he or she was improving and if the student thinks his or her reading is better than before he or she started graphing.

Table 13

Student Questionnaire Results

Questionnaire item	Mean	Range
Do you think it is important to read well?	3	3
Did you like plotting your score after the timed reading activity?	3	3
Did the graphs help you see how much you were improving?	2.75	1-3
Did you learn to read more words by doing this activity?	3	3
Do you think your reading is better than before you started graphing?	2.75	1-3
Would graphing be a good activity for teachers to use with other students?	3	3

Note. Students were instructed to circle 1 ("No"), 2 ("A Little"), or 3 ("Yes") for each item

The results of the teacher questionnaire indicated that four of five of the items were rated as 4 ("Strongly Agree"). These items included the following: (1) The assisted self-graphing intervention appeared easy to implement; (2) The assisted self-graphing intervention had positive effects on your students' reading fluency; (3) The assisted self-graphing intervention had positive effects on your students' overall reading skills; and (4) The students seemed to enjoy the assisted self-graphing intervention. The teacher rated a 1 ("Strongly Disagree") for the item that asked if the teacher would use this assisted self-graphing intervention in the future. The teacher commented that "Making the graphs looked like a lot of work and I am retiring after this school year".

In addition to the student and teacher questionnaires, the two first grade classroom teachers who were not involved in the self-graphing intervention were interviewed following the intervention period. These post-intervention interviews were conducted for the purpose of collecting additional data to assist with RtI team decisions regarding the

future use of this type of intervention. Both teachers noted that the preparation for self-graphing appeared time consuming (i.e., students selecting individualized graphs, making the graphs, preparing materials). However, the teachers commented that if this type of preparation was done by all teachers across grade level, it would help alleviate some of the time demands. Both teachers reported that they would be willing to utilize this type of intervention within their classroom settings. Both teachers also reported that the bi-weekly progress-monitoring alone appeared to have positive effects on the students involved and they were pleased with the progress of these students.

Chapter 5

Summary, Discussion, and Recommendations

Students who are self-regulated learners are active participants in their own learning. The ability for self-regulation is being recognized increasingly as an essential part of social development and as an essential part of the ability to learn in school (Howse, Calkins, Anastopoulos, Keane, & Shelton, 2003). Self-regulatory abilities are desirable, but do not always develop naturally for some children (Harris & Schmidt, 1997). There exists a need to develop self-regulation skills in students. Self-monitoring is a form of self-regulation that affects behavior and academic functioning. Self-monitoring techniques, which can help to develop self-regulation, are also considered research-based strategies. Self-monitoring techniques can be used as a targeted intervention to improve all students' learning and can be used in a variety of settings. This can be especially useful within the context of the Response to Intervention (RtI) model that currently exists in education.

The current study sought to extend the literature on the efficacy of self-monitoring techniques on academic skills. The purpose of the study was to evaluate archival data collected from an RtI intervention that involved "at-risk readers" from the first grade. The intervention involved the use of DIBELS progress monitoring probes coupled with assisted student self-graphing. The goal of the intervention was to improve early literacy skills in these "at-risk readers". The student reading progress was evaluated by analyzing data available from DIBELS Benchmark assessments (pre- and post-test) along with 5 DIBELS progress monitoring probes. The purpose of the investigation is to examine the

effectiveness of a self-graphing supplemental intervention that occurred outside of the class-wide, first grade reading instruction.

Study Findings Related to Self-Monitoring for Improving Academic Skill Production

The current study examined the use of a self-monitoring intervention for improving academic skill production in the area of reading fluency. The results indicated that the group of first grade students identified as "at-risk readers" who were provided with the progress-monitoring and self-graphing intervention (PM + SG group) made gains in their DIBELS scores in the areas of Phoneme Segmentation Fluency (PSF) and Nonsense Word Fluency (NWF) during the intervention period.

In the area of PSF, all students in the intervention group met and exceeded the Benchmark goal (35 phonemes per minute) by the post-test (December Benchmark). It must be noted that this Benchmark goal is supposed to be established by the end of kindergarten and/or beginning of first grade. Therefore it is expected that the students should be achieving beyond this rate by this time. Nevertheless, these students did make excellent gains with overall growth rates ranging from 45 to 260 percent. It was observed that the student in the intervention group who met and maintained the PSF Benchmark most quickly appeared to be the most highly motivated. This student would frequently report that he or she had practiced reading at home and the student appeared driven to beat the previous score. There were two students from the intervention group who were not identified as "at-risk" in the area of PSF following the pre-test (September Benchmark). These students were not progress-monitored in the area of PSF and were assessed only at pre- and post-test (September and December Benchmark assessments). Interestingly, these two students made the smallest amount of overall growth in the area

of PSF and had some of the lowest post-test scores within the intervention group. It is hypothesized that these students made the smallest amount of overall growth and had some of the lowest post-test scores because they were not provided with the bi-weekly progress-monitoring and self-graphing in PSF.

In the area of NWF, all students in the intervention group met and exceeded the Benchmark goal (50 phonemes per minute) by the post-test (December Benchmark). These students again made excellent gains with overall growth rates ranging from 63 to 246 percent. There were two students from the intervention group that were not identified as "at-risk" in the area of NWF following the pre-test (September Benchmark). These students were not progress-monitored in the area of NWF. Interestingly, one of these two students made the smallest amount of overall growth in the area of NWF and had the lowest post-test scores within the intervention group. This student went from being "Low Risk" to "Deficit" in the area of NWF. It could be hypothesized that this student made the smallest amount of overall growth and had the lowest post-test scores because he or she was not provided with the bi-weekly progress monitoring and self-graphing in NWF. However, this was not the case with the other student who was not progress-monitored in NWF. Therefore, these findings do not necessarily support this hypothesis. The results in the area of NWF along with the findings in the area of PSF do suggest that the use of the self-monitoring intervention resulted in good overall growth, with higher levels of academic skill production by the end of the intervention period.

The current study findings are consistent with previous research findings, which support the use of self-monitoring techniques as a method for improving academic skill production. Past research has found that self-monitoring interventions not only assist with

the development of self-regulation, but also have been found to increase academic engagement and enhance academic skills across content areas, such as reading and mathematics (DiGangi, Maag, & Rutherford, 1991; Harris, 1986; Lalli & Shapiro, 1990). Self-monitoring strategies have been shown to improve performance in specific skill areas of reading accuracy (McLaughlin & Truhlicka, 1983; Lalli & Shapiro, 1990), reading fluency (Bray, Kehle, Spackman, & Hinze, (1998), and comprehension (Jitendra et al., 2000).

Study Findings Related to Comparing Academic Skill Production Based on Participant Group

The current study examined the use of a self-monitoring intervention by comparing the reading fluency performance of the three participant groups. The groups included the intervention group (PM + SG), the progress monitoring-only group (PM), and the non-intervention and non-progress monitoring comparison groups (NI). It must be noted that it is difficult to compare the raw scores of students in the three groups reliably because of the variability of the baseline (pre-test) data. Percentages of growth rates were calculated for each student to help address this issue. The results indicated that students in all three groups made gains in their DIBELS scores in the areas of Phoneme Segmentation Fluency (PSF) and Nonsense Word Fluency (NWF) during the intervention period, regardless of participant group.

When making comparisons in the area of PSF, 100% of the PM + SG group and 100% of the PM group met and exceeded the Benchmark goal, whereas 92% of the NI group met and exceeded the goal. The students in the PM + SG group and PM group achieved the Benchmark goals at approximately the same rate, overall (between session

3 and session 4). As previously noted, the rate for achieving Benchmark is not available for the NI group because these students were provided only with the pre- and post-assessment. The students in the PM + SG group and PM group demonstrated a range with higher levels of overall growth when compared with the NI group. More students from the PM + SG group produced higher post-test scores when compared with the PM and NI groups.

When making comparisons in the area of NWF, 50% of the PM + SG group, 38% of the PM group met the goal, and 55% of the NI group met and exceeded the goal. When comparing the PM + SG group with the PM group regarding rate of achieving Benchmark goals for NWF, it appears that the students from the PM + SG group that were able to meet the Benchmark goal did so at a slightly faster rate. This finding is consistent with previous research indicating that individuals receiving more immediate and frequent external feedback during practice made fewer errors or reached the performance criterion faster than those who received delayed or less-frequent feedback (Goodman, 1998). On average, the PM + SG students met the Benchmark goal between sessions 4 and 5. The students in the PM group that were able to meet the Benchmark goal did so between sessions 5 and 6. Again, the rate for achieving Benchmark is not available for the NI group because these students were provided only with the pre- and post-assessment.

The students in the PM + SG group and PM group demonstrated a range with higher levels of overall growth when compared with the NI group. More students from the PM + SG group produced higher post-test scores when compared with the PM and NI groups. Further analysis using a DIBELS Rates of Improvement (ROI) criterion score

indicates that 33% of the PM + SG group were below the criterion. From the PM group, 50% were below the criterion and from the NI group, 45% were below the criterion. This indicates that fewer students in the PM + SG group are "at-risk" for falling below the subsequent DIBELS NWF Benchmark goal. Using the ROI ratio of deficiency calculation, one student from the PM + SG group (17%), one student from the PM group (13%), and three students from the NI group (27%) were considered a concern. This indicates that more students in the NI group, when compared with the other two groups, demonstrate rates of improvement that are of concern.

The growth and rates of improvement data are important information when measuring student progress and making intervention decisions, especially within an RtI model. It has been suggested that the use of ROI can help teams make instructional decisions. These decisions can assist in the selection of more responsive short-term interventions to address student needs. These data-based instructional decision are important for students who are at-risk for learning difficulties (Ditkowsky & Koonce, 2009).

It must be noted that Shapiro & Clemens (2009) have cautioned the use of ROI at the individual student level. The reason for this is that ROI is based on the trend of data points, which is sensitive to many factors, such as the number of data points used to determine the trend. When using ROI based on benchmark data, the trend would be determined by two or three data points. Therefore a single data point would greatly influence the ROI calculation. An aggregation of the data across individuals within a group or grade may lesson the impact of individual variation. Based on this, considering the ROI by group may be a better measure of intervention effectiveness that was used in

this study. As seen in this study, the ROI of the PM + SG group met the benchmark ROI criterion and the average ROI was also higher than the PM and NI groups. A consideration when using ROI for instructional decisions is that the slope is impacted by the starting point for the student's performance. For example, students whose starting point is at a lower level, but show growth over time would have different predicted outcomes than students who start just below benchmark, but do not show growth over time (Shapiro & Clemens, 2009).

It is difficult to determine if increases in academic skill production are due solely to the implementation of the intervention. All students demonstrated increases in academic skill production on measures of PSF and NWF, regardless of the participant group. The students in the intervention group and the students in the progress-monitoring only group demonstrated higher rates of overall growth when compared with the students who did not receive the intervention and were not progress-monitored. This may suggest that progress monitoring in and of itself is a form of self-regulation by increasing the awareness of the student. The students in the intervention group did demonstrated higher post-test scores for both PSF and NWF when compared with the students' scores in the other groups. The students in the intervention group also demonstrated a lower risk for not being able to attain subsequent NWF goals and an overall higher ROI. This may suggest that the intervention helped the students' awareness so that they were able to monitor their performances and achieve at a higher rate. These students received performance feedback regarding their progress toward the DIBELS goals, whereas the students in the PM and NI groups did not. This performance feedback may have helped

the students' awareness and/or motivation to attain the goals and perform at a higher level than they did in the previous session.

The findings of the current study are consistent with previous research that involved performance feedback (Fuchs et al., 1991; Pany & McCoy, 1988; Van Houten, Hill, & Parsons, 1975). In a study by L.S. Fuchs and Fuchs (1986), it was found that performance feedback resulted in significant increases in academic achievement. Also, the effects of this intervention were enhanced when the data from performance evaluations were graphed rather than being simply recorded. It was speculated that this effect may be due to the fact that graphing of performance data allowed for more frequent feedback to the students. The current findings are also consistent with previous research that involved self-graphing. Past research has indicated that self-graphing alone appears to have a positive effect on improving recorded performances (Farrell, 2007; Gunter, Miller, & Venn, 2003; Moxley, 1998; Shimabukuro et al., 1999; Stotz, Itoi, Konrad, & Alber-Morgan, 2008).

Study Findings Related to Perceptions of the Self-Monitoring Intervention

The current study examined student and teacher perceptions regarding the use of a self-monitoring intervention for improving academic skill production in the area of reading fluency. The results indicated that all students reported a high level of acceptability of the intervention. The students reported that they felt it is important to read well, that they liked plotting their scores, that they learned to read more words by doing the activity, and that graphing would be a good activity for teachers to use with other students. There were two items for which one of the eight students indicated low acceptability. These items assessed whether or not the graphs helped the student see how

much he or she was improving and whether or not the student thought his or her reading was better than before he or she started graphing.

Anecdotal reports regarding observations of student interest and motivation supported the students' questionnaire results. Several students informed their teacher or DIBELS progress monitor that they were practicing their reading so that they could improve their scores. All of the students appeared to take pride in their accomplishments, especially when they met the Benchmark goal or if their score was toward the top of their graph. Frequently, the students would ask the DIBELS progress monitor how they were doing toward meeting their goals and wanted to see the progress on their graphs. They shared the results with other students and congratulated one another. They appeared to enjoy greatly choosing their individualized graphs and coloring them in every-other week.

The results indicated that the teacher involved also reported a high level of acceptability of the intervention. It was indicated that that the teacher strongly agreed that the intervention appeared easy to implement, had positive effects on the students' reading fluency and overall reading skills, and that the students seemed to enjoy the intervention. It is noted that the teacher strongly disagreed when asked if he or she would use this assisted self-graphing intervention in the future. The teacher comments included the following: "Making the graphs looked like a lot of work and I am retiring after this school year".

In addition to the student and teacher questionnaires, the two first grade classroom teachers who were not involved in the self-graphing intervention were interviewed following the intervention period. These post-intervention interviews were conducted for

the purpose of collecting additional data to assist with RtI team decisions regarding the future use of this type of intervention. Both teachers noted that the preparation for self-graphing appeared time consuming (i.e., students selecting individualized graphs, making the graphs, preparing materials). However, the teachers commented that if this type of preparation were done by all teachers across grade level, it would help alleviate some of the time demands. Both teachers reported that they would be willing to utilize this type of intervention within their classroom settings. Both teachers also reported that the bi-weekly progress monitoring alone appeared to have positive effects on the students involved and they were pleased with the progress of these students.

These results indicate positive perceptions and high levels of intervention acceptability from both students and teachers. These results support previous self-monitoring research indicating similar findings. Gunter and his colleagues (2002) reported the following, "Students we work with have become not only able to assist with the data-collection process and enhance their performance, but they often expressed enthusiasm for graphing their own performance" (p.30). Self-graphing could be viewed as a time saving tool for teachers who use the students to graph their own data rather than the teacher recording the data. The self-graphing technique is supported by the many benefits that have been reported in the literature. Some of these benefits include the mere act of learning to graph, the motivational benefits, the immediate performance feedback; students have also reported that this technique was enjoyable. These benefits were reported and observed in the current study.

Implications for Practice

The current study findings are consistent with previous research findings, which support the use of self-monitoring techniques as a method for improving academic skill production. These findings have important implications for educators who are working toward achieving student academic goals and are also fostering the development of student self-control. In classroom settings, self-regulatory abilities are critical to the child's development and learning process (Harris et al., 2005). Self-monitoring is a part of the self-regulation process. The goal of education is to develop life-long learning skills that will assist in the ability to meet academic standards. It appears that the development of student self-regulation and self-monitoring skills would help to develop these life-long learning skills needed for academic success. Educators also need to foster skills that will extend beyond the academic environment and will assist in student development of responsible and independent work skills.

In addition to developing self-monitoring skills in students, the current study demonstrated the fact that a self-graphing intervention helped to increase academic skill production in the area of reading fluency (Phoneme Segmentation Fluency and Nonsense Word Fluency). It must be noted that all groups of participants demonstrated skill increases; however, the students in the intervention group tended to perform at a higher level on post-test measures when compared with the students in the other groups. This is an important finding that suggests that this type of intervention is useful to assist "at-risk" students in reaching Benchmark levels.

The self-graphing intervention involved in this study was a relatively easy intervention to implement. It did involve several hours of preparation time to tutor the

students, prepare the individualized graphs, and prepare the DIBELS progress monitoring materials. However, once these tasks were completed, the progress monitoring and self-graphing did not involve a great deal of time (approximately 3 minutes per student on a bi-weekly basis). It is anticipated that once a bank of graphs are developed, the amount of preparation time would be limited because the teacher could use these materials. The teacher involved in the current intervention reported positive effects for the students. If not retiring, the teacher may have utilized this type of intervention in the future. The other first grade teachers at this school setting reported that they would be interested in such an intervention, especially if they worked together to develop the materials.

The self-graphing intervention appeared to be a motivational tool for many of the students involved. The students appeared interested and invested in the intervention process. The students enjoyed working on their graphs and seeing their progress. They showed pride in their accomplishments, especially if they obtained the Benchmark goal. They reported high levels of acceptability, which supports the use of this intervention. This intervention served as a method of frequent performance feedback for the students. The data that was obtained from the bi-weekly DIBELS progress-monitoring sessions also served as a way to inform teacher instruction based on student performance and need. The graphs helped to inform the parents regarding their child's progress because the graphs were sent home following the intervention period. Based upon student performance, student interest, and teacher acceptance it is recommended that this intervention be implemented with other students within the same school setting.

Self-monitoring interventions are empirically-based and fit well into the current RtI model that exists in education. The use of research-based interventions is recommended

to help students achieve academic and behavioral goals. There is a need for the development of additional research-based interventions that would fit into the RtI model. The current intervention could function as an intervention to help increase reading fluency production (phonological awareness and decoding that is measured by DIBELS PSF and NWF) for at- risk students.

The type of intervention outlined in this study could be used in similar settings with similar populations of students. It presents with a practicality that lends itself to a variety of situations that could help address a variety of student needs. Self-monitoring strategies have been used with students who have intellectual and learning disabilities, and Attention Deficit/Hyperactivity Disorder (ADHD). Self-monitoring techniques have been used in both special and general education settings to increase students' academic engagement and productivity (Rock, 2005).

However, there is a concern regarding the use of progress-monitoring and self-graphing alone as a means for improving academic performance. One must consider that if a student receiving such an intervention did not demonstrate significant gains, this could be due to a skill's deficit rather than a performance deficit. Therefore the motivational effects and performance feedback of the current intervention could be helpful for some, but may not be helpful for those in need of specific skill remediation. This intervention is not intended to remediate skill deficits that could be due to learning disabilities.

Limitations

There were multiple limitations that may have impacted the results of this study. The current study consists of a sample of convenience. The results are based upon a pilot

study that involved a small number of students. These results are limited because of the lack of diversity in the sample. Also, because the sample size is limited the number of scores available is limited and therefore the analysis of data was not able to be based on tests of statistical significance in order to compare the groups. The sample size of the participants in each group was small, especially the PM group for PSF. This results in the generalizability of the findings being limited to a population that is based on relatively the same characteristics. Although the current study utilized archival data, one must consider the fact that student reactivity to intervention and assessment could have accounted for the results.

One threat to the internal validity of the study relates to the nature of the setting involved in this study. The gains that were seen in the students' reading fluency skills could have been impacted by other variables outside of the study. Such variables could have included supplemental or alternative instruction outside of the school setting (i.e., parent teaching and private tutoring). It was noted that the students who received supplemental reading support within the school setting did not demonstrate significant gains when compared with the other students. Student attendance was not examined; however, this is another variable that could have impacted student progress. Students with lower levels of growth could have been absent more frequently than those students who demonstrated higher levels of growth.

Another limitation of the study relates to test-retest practice effects. Although the DIBELS Benchmark assessment uses alternating versions/probes for assessment and progress monitoring, the tasks are presented in similar formats to the student. The effects of retesting may have been especially pronounced with the students who received the bi-

weekly progress monitoring (PM + SG and PM groups). In addition, the possibility for regression toward the mean exists. There is a tendency for extreme scores to revert toward the mean with repeated administration. However, none of the students involved in this study scored higher at pre-test than at post-test. One consideration that appears to be more relevant to this particular study is the impact of using growth rates as a comparison measure. When using this type of measure, one must consider that students who score lower on the pre-test measure and are considered more "at risk" have more room for growth. They may demonstrate high growth rates, but still score below the Benchmark criterion. One must keep this in mind when using growth rates or ROI rates when analyzing student performance.

Possible differences in inter-rater reliability for DIBELS measures must also be considered as a limitation. All first grade students were evaluated using the DIBELS fall and winter Benchmarks by one of the building reading specialists. The students that were progress monitored were evaluated using the DIBELS progress monitoring probes by one of the RtI team members. The same team member administered all DIBELS progress monitoring probes.

Selection bias exists as a threat to the study. The students in the intervention group were selected based on their "at risk" status and all came from the same classroom setting. The students in the three participant groups were not randomly assigned. This introduces other variables that could have impacted the students' performance. For example, teacher effects could have factored into student growth. In addition, some students selected for the intervention reached or exceeded subsequent DIBELS goals during the intervention period. Based on this, the student no longer demonstrated a need

for the intervention to assist in increasing academic skill production. This may have resulted in skewed post-test data.

An additional limitation of this study includes the subjective nature of the student and teacher questionnaires and post-intervention teacher interviews. The teacher involved reported acceptability and positive perceptions of the intervention. Also, the remaining first grade teachers reported an interest in implementing such an intervention. However, it must be noted that these teachers did not directly implement the intervention.

Recommendations for Future Research

Further study of this type of intervention is warranted, especially given the limitations involved. There are several recommendations for future research based on the current study results. First, to increase generalizability, it is recommended that future studies involve self-graphing for other reading skill areas. For example, does self-graphing PSF and/or NWF improve performance on oral reading fluency measures. Or does self-graphing oral reading fluency help to improve reading comprehension performance? It is also recommended that future studies involve self-graphing for a variety of skill areas. For example, are students able to apply self-graphing skills to other content areas?

Future studies could involve student self-monitoring and self-graphing based on different types of measurements that are outside of the scope of what is evaluated by the DIBELS Benchmark assessment. This may help to evaluate if a higher level of self-monitoring or increased levels of performance feedback translate into improved performance in other skill areas. If so, this would further support the use of self-monitoring interventions in the school setting.

In addition, this study did not assess long-term maintenance of the effects of self-graphing on the students' reading fluency. A future study should attempt to collect long-term maintenance data for the participants. This would help to determine if the performance improvements that were demonstrated would persist over time. It would be interesting to follow a group of "at risk" readers who made significant improvements at an early age and were no longer considered "at risk" to determine if these students were able to maintain their on-level performance throughout their schooling.

This study also did not formally assess the motivational aspects that are involved in developing a student's self-regulation and self-monitoring skills. It would be interesting to evaluate the impact of motivation on academic performance, especially when the student is provided with frequent performance feedback and when the student demonstrates gains. For example, a research question could explore if an increase in self-regulation results in higher levels of student motivation that can be observed in other academic areas.

Another suggestion would involve the study of interventions for students who show inadequate response rates. This may help to develop more effective strategies and interventions for these types of learners. It would also add to the bank of research-based interventions that would be applicable with the RtI model.

This study consisted of a small sample size. Future studies should consider implementing with a large number of students, perhaps on a class-wide or grade-level basis. It is noted that this type of approach may require modifying typical classroom practices in order to monitor a large group of students. Future studies could also include populations of diverse learners (i.e., students with Learning Disabilities, ADHD, and

English Language Learners). Future research could also only provide the intervention to participants who are not already receiving another reading intervention (i.e., reading support) to better determine the effects of the sole intervention.

Despite the limitations presented, the current findings were consistent with the available research base in the area of self-monitoring. The results indicate that the self-graphing intervention was an effective strategy for developing self-monitoring skills while also increasing academic skill production in the area of reading fluency. This study also contributes to the emerging literature on the use of self-graphing measures with elementary-aged students. Teachers should consider the use of a self-monitoring intervention to increase academic skills as research continues to indicate the efficacy of these approaches.

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