THE EFFECTS OF GROUP SIZE ON READING OUTCOMES OF IDENTIFIED NONRESPONDERS

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Dissertation

Submitted to the Faculty of the

Graduate School of Vanderbilt University

in partial fulfillment of the requirements

for the degree of

DOCTOR OF PHILOSOPHY

in

Special Education

May, 2008

Nashville, Tennessee

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ACKNOWLEDGMENTS

I would like to thank my wonderful family and friends for all of your support. Mike, Mom, Dad, Candy, and David: You have all been there for me during this entire process cheering me along, nudging me along, and supporting all the other life events that can sometimes get in the way. For my children, Tyler and Jenna, you are my inspiration and my hope for the future. I love you all.

My sincere appreciation to my advisor, Doug Fuchs, who never gave up on me and has given me so many wonderful opportunities. I have learned so much from him and his work. Also, to my entire committee for your wonderful suggestions.

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CHAPTER I

INTRODUCTION

Students with specific learning disabilities comprise 47% of the placements in special education, with reading disabilities being the most common classification (Lyon, 1995). Much research has focused on remediating reading deficits in young students because researchers have documented the long-term negative consequences of early reading failure (e.g., Juel, 1988). In 1998, a panel of reading experts published a report that synthesized the available research in reading (National Reading Panel, 1998). The report claimed that the best reading instruction included direct, systematic instruction in phonemic awareness, phonics, fluency, vocabulary, and reading comprehension. These essential skills have been termed the building blocks of reading (Center for the Improvement of Early Reading Achievement, 2001). Intervention studies (e.g. Blachman, Ball, Black, & Tangel, 1994; Foorman, Francis, Fletcher, & Schatschneider, 1998; Torgesen, Alexander, Wagner, Rashotte, Voeller, and Conway, 2001) have found that teaching these building blocks of reading can significantly increase students' phonological awareness skills and word recognition skills.

Treatment Nonresponders

Many students nevertheless do not respond to generally effective reading instruction (e.g., Vellutino, Scanlon, Sipay, et al., 1996). Approximately 50% of students with disabilities (e.g., Fuchs, Fuchs, Thompson, Al Otaiba et al., 2001; Torgesen, 2000),

and 20% to 30% of students at-risk for reading failure, do not benefit from best practices in reading instruction (e.g., Al Otaiba & Fuchs, 2002; Blachman, et al., 1994; Mathes, Howard, Allen, & Fuchs, 1998). This translates to approximately 2-6% of the total school population. These students are typically referred to as "nonresponders."

With the President's signing of the No Child Left Behind legislation (2002), these findings are troublesome to advocates, practitioners, researchers, and policy makers. Funding has increased for additional research on how to identify and treat nonresponders, which has led to national concern over current methods of LD identification. Specifically, the IQ-achievement discrepancy model has been widely criticized on several fronts (see Kavale, 2002 for a full review). Most notably, critics say, students are not identified for special education services until they have already experienced long-term failure in the general education classroom. Some have proposed a new identification procedure that includes three tiers of identification. In tier I, all students' performance is monitored in general education. In tier II, group instruction is provided to those unresponsive to classroom instruction, and their performance at this second tier is monitored. Finally, tier III, would be special education placement. The final tier would be reserved for the children unresponsive to instruction at tiers I and II; that is, chronically unresponsive students. It is important for the policy makers, researchers, school administrators, and school teachers to understand the characteristics of nonresponders, the definition of nonresponsiveness, and how to best educate these students.

Study of nonresponders has had several dimensions. First, characteristics of nonresponders have been examined (Al Otaiba & Fuchs, 2002; Torgesen & Davis, 1996; Vellutino et al., 1996). This research is important because it can lead to earlier

intervention as well as better intervention plans for these students. Students could be identified earlier as being at-risk for reading failure and placed in appropriate research-based interventions.

Second, researchers are studying how best to define nonresponsiveness to treatment. Togesen et al. (2001), for example, defines nonresponsiveness as scoring below 90 on a standardized test. This is a stringent criterion. It is difficult to increase students' standard scores because they are being compared to their peer group, which is always improving more or less. Therefore, to close the gap between targeted students and peers the targeted students must make relatively large gains. To say that students one standard deviation below the mean prior to intervention are "nonresponsive" to a treatment because their performance is unequal to the group mean at posttest is likely to be insensitive to whether growth may have occurred. If one considers that a student must make progress to *maintain* a standard score, it would seem to make little sense to expect students with disabilities to be "average" after intervention.

As an alternative to Torgesen's definition of nonresponsiveness, Fuchs, Fuchs, and Speece (2002) have suggested use of a dual discrepancy model. Students are identified as nonresponsive using both the slope and level of reading achievement using curriculum-based measures (CBM). This model accounts for how low the student's achievement is at a point in time as well as growth of skills over time. Moreover, CBM is a reliable and valid measure of student progress. The dual-discrepancy method eliminates several serious problems with current methods of nonresponder identification. But it still does not answer the question; What level and how much growth is desirable? Criteria for performance level and growth are still arbitrary.

A third line of research has focused on determining ways to bolster effectiveness of reading programs for children not responsive to effective teaching strategies. While the National Reading Panel Report (1998) documented best practices in reading, the focus has shifted to what elements of intervention (i.e., pacing, intensity, duration, group size, expertise of the instructor) can increase student responsiveness.

Increasing Responsiveness to Reading Instruction

Group Size

Grouping for reading instruction has been a major area of contention in the field of education. In the 1960's and 1970's, students were often placed in small groups with other children who were at a similar instructional level. More recently, students are placed in multiple-ability groups (Schumm, Moody, & Vaughn, 2000). The rationale behind this shift from homogeneous grouping to heterogeneous grouping has been to prevent low self-esteem in students in low-achieving groups and to provide good reading models for the poor readers. The inclusion movement (placing students with disabilities in the general education classroom) has also decreased homogeneous grouping and increased heterogeneous grouping.

Moody, Vaughn, and Schumm (1997) interviewed general and special education teachers to determine their grouping practices. They found that general education teachers typically relied on whole-class instruction. In contrast, special education teachers typically grouped students based on their developmental level. Elbaum, Schumm, and Vaughn (1997) followed up these teacher interviews with interviews with students to

determine how they felt about grouping. Overall, students said that participating in multiple-ability groups was more beneficial than whole-class instruction or homogeneous grouping.

Surprisingly little research has been conducted to explore possible differential effects of group size (e.g., whole class instruction vs. small groups of three to five children vs. individual instruction) on students' reading performance. Whereas intensive, individualized instruction has been shown to remediate severe reading deficits of many children (e.g., Torgesen, Wagner, Rashotte, & Herron, 1999), scant resources in schools often make individualized programs uneconomical and infeasible. That is, whereas Torgesen et al. (1999) provided instruction 4 days a week for 2.5 years for all at-risk students in one district, special education in most districts provide little, if any, individualized instruction (Vaughn, Moody & Schumm, 1998). According to Vaughn et al., most special education instruction is provided in groups of 5 to 19 students.

Although it is widely assumed that 1:1 intervention is superior to small group direct instruction, little research has systematically been conducted to test this belief. In fact, the National Reading Panel (1998) found that 1:3 instruction may be as effective as 1:1 instruction if students are on the same developmental reading level. Elbaum, Vaughn, Hughes, and Moody (1999) conducted a meta-analytic review to determine the grouping practices that had the best academic outcomes for students with disabilities. They found that students in small groups or in peer tutoring made impressive gains in decoding, suggesting that small group instruction may be as effective as individual tutoring. Peer tutoring, they pointed out, can be used with an entire class (e.g., classwide peer tutoring), limiting the amount of teacher time and resources needed. However, the researchers of

the work included in Elbaum et al's meta-analysis did not directly compare effects of small group instruction to 1:1 instruction in the same experimental design. The research studies were reviewed separately and conclusions were drawn based on effect sizes, not direct comparisons.

Thurlow, Ysseldyke, Wortuba, & Algozzine (1993) conducted a descriptive study of small groups. She examined how eight variables were affected by different grouping formats. For students in 1:1 tutoring, there were no differences in academic responding time, academic engagement time, task management, or inappropriate behavior when compared to students in 1:3 tutoring. However, as group size increased beyond three students, 1:1 instruction was superior. An obvious inference is that students will perform equally well in a group of three as in 1:1 tutoring. However, Thurlow, like Elbaum et al. (1999), did not directly examine the differences in academic outcomes of students in small groups versus individual tutoring.

Standardized Versus Individualize Instruction

Another major issue in increasing responsiveness to intervention is the extent to which academic materials must be individualized for each student. Large-scale research studies (e.g., Torgesen et al., 1999) typically implement comprehensive and standardized tutoring packages that are, by definition, the same for all the participants. What is not clear is the extent to which materials should be modified to meet the needs of individual students. No studies could be found that directly examined this issue despite apparently important implications. If standard and individualized approaches were found equally effective, then the standard approach would probably be seen as more useful because it

would be easier to implement. That is, teachers and/or tutors could be trained on a set of tutoring materials and they would implement these for all struggling readers. Individualizing instruction, by contrast, requires extensive training in reading methods, recognizing when progress is not being made, and modifying instruction in reasonable ways. In addition, effective individualized tutoring depends a great deal on rigorous training, professional experience, and clinical judgment. A standardized tutoring program reduces the amount of training, experience, and judgment required to implement the program.

Purpose

The purpose of this study was to involve second-graders unresponsive to research-validated classroom instruction (i.e., Peer Assisted Learning Strategies; PALS) in four treatments: one to one standardized, one to one individualized, one to three standardized, and continuation in large-class PALS. The research questions were: (a) Does individualizing tutoring promote greater reading growth than a standardized approach? (b) Do students in standard 1:1 instruction show greater improvement than those in small group standard instruction? Students' reading ability in class-wide PALS was monitored to identify those who were not responding to the PALS program. Nonresponders were identified as dually (level and slope) discrepant. They were assigned randomly to individualized 1:1 tutoring, standardized 1:1 tutoring, and standardized 1:3 tutoring. Or they were chosen randomly to remain in the PALS class-wide program. Nonresponders were monitored weekly to determine which method of instruction increased the reading performance. Thus this research explores the importance of group

size (1:1 versus 1:3) and standardized instruction versus individualized instruction in terms of students' reading growth.

Importance

Whereas teams of researchers have documented the efficacy of small group instruction for students with disabilities (e.g., Elbaum et al., 1999; Moody et al., 1997), there has not been experimental study of how well small groups work for students unresponsive to research-based, generally effective instruction. In addition, there has been no direct comparison between 1:1 tutoring and 1:3 tutoring. If small-group tutoring is as effective as 1:1 tutoring, special education resources could potentially be used more efficiently to support instruction in small groups. This study may also shed light on whether individualized and standardized tutoring are equally effective for students who are nonresponsive to classwide instruction. Standardized instruction requires much less training, experience, and judgment thereby reducing costs for teacher training.

This study also incorporates several desirable methodological components. Random assignment was used to place students in treatment groups. Treatments represented practices validated as effective for many at-risk students. Fidelity of treatment implementation was established for all study groups. Identification of nonresponders was based on a dual discrepancy model (i.e., level and slope of reading scores were taken into account). That is emerging as a valid index of nonresponsiveness (e.g., Fuchs, Fuchs, & Compton, 2004).

CHAPTER II

LITERATURE REVIEW

This chapter reviews the literature in which researchers have compared different grouping practices for students with and without disabilities to determine most effective instructional arrangements. First, a rationale for the importance of this topic is provided. Second, methods of the literature search will be defined. Finally, findings of the literature search will be described, organized in terms of (a) meta-analyses and prior non-quantitative reviews of the effects of 1:1 instruction, (b) meta-analyses and prior reviews of small-group instruction, (c) meta-analyses and prior reviews of 1:1 versus small-group instruction, and (d) studies in which researchers directly compared 1:1 and small- group instruction. Finally, implications for future research are provided.

Rationale for the Importance of Research on Grouping Arrangements for Instruction

Determining the most effective interventions for students at risk of reading failure and those with reading disabilities has constituted a large part of the research in the past two decades. A systematic review of this literature by the National Reading Panel (1998) highlighted the components of effective reading instruction. These components were phonemic awareness, decoding, vocabulary, comprehension, and fluency instruction. However, with the implementation of the policy of inclusion, many students with reading disabilities are being served in the general education classroom. Classroom teachers must

meet the particular needs of all their students. The question becomes, what is the best way to meet students' needs who experience serious reading difficultie. Do students require one to one instruction to be successful? Are small-group arrangements as effective as 1:1 instruction? Are there classwide methods as effective as 1:1 instruction or small-group instruction? These questions are very important because schools generally have very limited resources, and they are understandably interested in identifying effective instructional procedures that are also economical. In addition, as the nation moves toward using Response-To-Instruction as the means of providing early intervention and identifying students with learning disabilities, there is a need to determine if Tier 2 intervention (i.e., group instruction) is differentially effective than Tier 3 intervention (i.e., 1:1 instruction in special education).

Literature Search

Inclusion Criteria and Search Strategies

Published and unpublished scholarly articles were selected using four criteria. First, the articles described interventions targeting reading skills. Second, study outcomes included reading measures. Third, study participants were at-risk for reading disabilities or had a documented reading disability. Fourth, the studies either reviewed the literature on different grouping formats or directly compared small group versus one to one instruction.

The literature search was conducted in the following way. The terms *learning disabilities, reading disabilities, intervention, treatment, remediation, instruction, small*

group instruction, one to one instruction, and *whole class instruction* were entered into a computer search using Educational Resources Information Center (ERIC) from 1966-2004; Psych Lit from 1967-2004; and Exceptional Child Educational Resources (ECER) from 1969-2004. Second, the abstracts produced by this search were reviewed to determine which articles met the inclusion criteria. Third, articles were obtained and their respective reference sections were examined for other articles that were likely to meet the inclusion criteria. Finally, a manual search was conducted of the following journals from January, 1980, to December, 2004: *Journal of Educational Psychology, Journal of Experimental Child Psychology, Journal of Learning Disabilities, Journal of Special Education, Learning Disabilities Research and Practice, Reading Research Quarterly, Remedial and Special Education, and Scientific Studies of Reading.* If the title of an article indicated that the study involved a reading intervention, the abstract was read to determine its usefulness for this review. As a result of this entire search, 12 articles were identified. These articles are signified by asterisks in the reference section.

Results

Meta-Analyses and Reviews of One-to-One Instruction

Table 1 provides methodological information for all meta-analyses and narrative reviews of 1:1 instruction. Table 2 summarizes the relevant findings.

Elbaum, Vaughn, Hughes, Moody, & Schumm (2000) conducted a meta-analysis to determine the effectiveness of 1:1 instruction for students at-risk of reading failure.

Thirty one studies were reviewed and analyzed to answer the following questions: (a) how effective is 1:1 instruction for children at-risk of reading failure, (b) what features of the intervention relate to intervention outcomes, (c) what research methodologies are associated with intervention outcomes, (d) how does Reading Recovery compare to other interventions, and (e) how does 1:1 instruction outcomes compare to small group intervention outcomes? The first three questions are most relevant here. The last two questions will be addressed later.

Elbaum et al. (2000) reviewed 31 studies which were published between 1975 and 1998. Participants were at-risk of reading failure or they had a diagnosed learning disability. A majority of participants across the studies were first graders (N=1164). There were 182 second and third graders, 130 fourth through sixth graders, and 63 first through fourth graders. There were a total of 216 *ES* comparisons. *ES*s ranged from -1.32 to 3.34. The authors then looked at seven variables to determine what mediated the instructional effectiveness. The variables included qualifications of instructors, tutor training, students' grade level, focus of intervention, outcome measures, intensity of the intervention, and treatment fidelity. Results indicated that college students were the most effective tutors (d = 1.65), followed by paraprofessionals (d = .68), teachers (d = .36), and volunteers (d = .26). Tutors' training was important. The *ES* for trained tutors was .59; 0.17 for untrained tutors. *ES*s for studies with and without fidelity of treatment were 0.85 and .06, respectively.

Students in grades 1-3 made statistically significant gains in 1:1 instruction (d = 0.37 to 0.49), whereas those in grades 4-6 did not make reliable gains. Students in interventions targeting reading comprehension had the greatest *ES* (d = 2.41), followed

Table 1

Methodological Information for Meta-Analyses and Narrative Reviews on 1:1 Instruction

Citation	Number of studies	Grade level	Risk Status	Inclusion Criteria	Inter-rater Agreement for Inclusion Criteria
Elbaum et al. (2000) *	31	1-6	at risk and LD	1. published or available between 1975 and 1998 2. participants scored in lowest 20-30 percentile on reading tests or labeled LD 3. outcomes compared to comparable students who did not receive 1:1 instruction 4. outcome data could be converted to effect sizes	not reported
Wasik & Slavin (1993)	16	1	at risk		not reported

Table 2

Relevant Findings for Meta-analyses and Narrative Reviews on 1:1 Instruction

Citation	Dependent Variable(s)	Effect Size
Meta-analyses and Narrative Reviews		
Elbaum et al. (2000)	Instructor	0.40-1.91
	Grade Level	
	1	0.59
	2-3	0.71
	4-6	1.06
	Dependent Measure	0.10-1.55
	Intervention Duration	
	Up to 20 weeks	0.77
	Over 20 weeks	0.57
Wasik & Slavin (1993)	Reading Recovery	0.49-1.50
	Success for All	0.42-1.34
	Prevention of Learning Disabilities	0.85-1.39
	Wallach Tutoring Program	0.64-0.75
	Programmed Tutorial	0.18-0.78

by interventions that included both decoding and comprehension (*d* = .50), decoding and word recognition (*d* = .44), and phonemic awareness intervention (*d* = 0.43). Interventions focusing on visual perceptual skills were associated with statistically non-significant *ES*s near zero. The outcome measures used in each study yielded the following *ES*s: Writing vocabulary, .94; listening comprehension, .68; decoding, .41 to .54; reading comprehension, .28; spelling, .14; and phonemic awareness, -.29. Standardized tests yielded smaller *ES*s (*d* = .53) than did non-standardized measures (*d* = .62). The average *ES* for interventions lasting up to 20 weeks was .65; whereas *ES* for those with a duration greater than 20 weeks was .37. The authors found that the same amount of instructional time delivered more intensively has more powerful effects.

In sum, Elbaum et al. (2000) found that college students were the most effective tutors, trained tutors were more effective than untrained tutors, and implementing interventions correctly is important. Younger students made more significant gains than older students. Reading comprehension interventions were more effective than decoding and word recognition interventions. And finally, non-standardized measures yielded greater effect sizes than standardized measures.

Wasik and Slavin (1993) conducted a best evidence synthesis of five 1:1 reading programs to determine their success in preventing early reading failure among graders. The reading programs were Reading Recovery, Success for All, Prevention of Learning Disabilities, Wallach Tutoring Program, and Programmed Tutorial Reading. Sixteen studies met Wasik and Slavin's inclusion criteria.

For Reading Recovery, the authors reviewed two longitudinal studies conducted by the Ohio State group and two other primary studies. In the first longitudinal study,

Reading Recovery was compared to general education instruction or Title I pull out for the lowest 20% of first graders in the schools. Students in the Reading Recovery group outperformed those in Title I small groups and those in the general education classroom on all measures except letter identification and word recognition. At the end of the year, the *ES* was .72 which diminished at 1 year follow up (.29) and lessened further at 2 year follow up (.14). In the second longitudinal study, students in Reading Recovery were compared to those in the general education classroom. At the end of the implementation year, the *ES* was .78 versus .46 at 1 year follow up and versus .25 at the 2 year follow up. However, 27% of the students were still performing below average at the end of the two year follow up. Moreover, these findings in favor of Reading Recovery should be taken with a grain of salt because the measurements were text-level reading assessments that directly correlated to what was taught in the reading program. In two other studies conducted by the Ohio State group to evaluate Reading Recovery, similar results were found. The *ES* at the end of the first year was .35 for dictation and .75 for text reading level.

The second program reviewed by Wasik and Slavin (1993) was Success for All. Like Reading Recovery, it focuses on teaching reading in context but also adds a word attack component. Tutoring was continued as long as the student needed it: Some students were tutored for 8 weeks; others for an entire year. This is different than Reading Recovery in which students were discontinued after 60 lessons regardless of whether they had made sufficient gains. Tutored students were in grades 1-3 and scored in the lowest 25% on the WRMT-R Letter-Word Identification and Word Attack subtest. The comparison group came from a matched comparison school. The overall mean *ES* after

year 1 was 1.01 for the first graders. The measures were letter word identification, word attack, oral reading and silent reading. The *ES* was 2.37 for year 2, .84 for year 3, and 1.83 for year 4. Similar results were found for students in grades 2 and 3.

The third program reviewed by Wasik and Slavin (1993) was the Prevention of Learning Disabilities. It differs significantly from the previous two programs in that there is very little reading for meaning. Students are taught word attack skills based on learning letter sounds. However, there is also no systematic phonics instruction. Students in grades 1-3 received instruction for two years, 3 to 5 days a week, 30 minutes per day. *ES*s indicated a significant increase in oral reading (d = .85), word identification (d = .94) and word attack (d = 1.39) when compared to no treatment controls. However, *ES*s were smaller when compared to other 1:1 treatment phonics-related programs.

The Wallach Tutoring Program was the fourth reviewed program. At-risk students received tutoring for one full year, 30 minutes per day. The program is very similar to Success for All in that it teaches reading in connected text as well as phonics rules. However, paraprofessionals are tutors instead of trained teachers. In two research studies, moderate to large *ES*s were obtained for children in the tutoring groups compared to no treatment controls. In the first study (Wallach & Wallach, 1976), *ES*s were .64 for word recognition, .66 for consonant sounds test. In the second study (Dorval, Wallach, & Wallach, 1978), *ES*s were .75 for a group administered test of reading skills including word identification, passage comprehension, and word analysis.

The final tutoring program reviewed by Wasik and Slavin (1993) was the Programmed Tutorial Reading. It is a supplement to the general education curriculum and is administered by parents, paraprofessionals, or volunteers. Its primary goal is sight

word identification, not reading in text or learning phonics rules. Across three studies, (Ellson, Barber, Engle, & Kampwerth, 1965; Ellson, Harris, & Barber, 1968; McCleary, 1971) there were no effects on the Stanford Achievement Tests.

Summary of 1:1 Tutoring Reviews

1:1 tutoring programs are effective for at-risk students. Elbaum et al. (2000) determined that trained tutors were much more effective than untrained tutors, younger children made more impressive gains than students in grades 4-6, and more intensive intervention was more important than amount of instructional time. Wasik and Slavin (1993) reviewed five 1:1 programs. They found that in four of the five programs, tutored students made more gains than those who stayed in the general education classroom or were pulled out for Title I instruction. Wasik and Slavin also found that one year of intervention may not be sufficient for all students. Ongoing programs are the best way to reduce the number of children who are at risk for reading failure.

Meta-analyses and Reviews of Small-Group Instruction

Table 3 provides methodological information for meta-analyses and narrative reviews of small-group instruction. Table 4 summarizes the relevant findings.

Lou et al. (1996) conducted a meta-analysis to determine the effects of different classroom grouping formats on the reading outcomes of students in elementary, secondary, and postsecondary settings. Sixty-six studies were reviewed. For the first analysis, grouping students in the classroom was compared to whole class instruction. The *ES* for those in small groups was .17 for achievement measures, a statistically

Table 3

Methodological Information for Meta-Analyses and Narrative Reviews on Small-Group Instruction

Citation	Number of studies	Grade level	Risk Status	Inclusion Criteria	Inter-rater Agreement for Inclusion Criteria
Elbaum et al. (1999)*	20	1-6	LD	1. participants had learning disabilities 2. English first language of participants 3. grades 1-6 4. grouping format described and specified 5. reading interventions 6. interventions took place at school 7. study available between 1975 and 1995.	90%
Lou et al. (1996)*	66	elementary, secondary and postsecondary	NA	1. intervention occurred in elementary, secondary or postsecondary classroom 2. within class grouping either in heterogeneous or homogeneous ability grouping 3. group size 2-10 students 4. grouping in place more than one day 5. all members of the group received the same training 6. report of outcomes for treatment and control group 7. research studies with primarily LD participants or gifted participants were excluded	88.24%

Table 4

Relevant Findings for Meta-analyses and Narrative Reviews on Small Groups

Citation	Dependent Variable(s)	Effect Size
Elbaum et al. (1999)	Length of Intervention	
	"Short"	0.21
	"Long"	0.36
	Dependent Measures	0.14-1.02
	Focus of Instruction	
	General Reading	0.62
	Comprehension	0.57
	Word Recognition	0.19
	Grouping Format	
	Pairing	0.40
	Small Group	1.61
Lou et al. (1996)	Group Size	
	Pairs	0.15
	Small (3-4)	0.22
	Medium (5-7)	-0.02
	Large (8-10)	0.11

significant *ES*. Like Elbaum et al. (2000), the authors found that researcher-made tests were more likely to show gains for the treatment group than standardized tests (d = .42 versus .07). This was especially true when the researcher-made test directly measured the material being taught. Methodological factors were also examined. Overall design quality of the study did not have an effect on student achievement outcomes. Stronger *ES*s were found in studies in which teachers in the small group condition received extra training (d = .42 versus .08) and when teachers in the small group condition used more or different materials than those used in the classroom (d = .26 versus .14).

Lou et al. (1996) also found that students in groups of three to four members outperformed those in groups of five to seven. Again, as in Elbaum et al. (2000), amount of teacher training explained a significant proportion of variance in student progress. The *ES* for no teacher training was .17; information only .24; minimal training .31; and extensive training .57. These were all statistically significant. In addition, treatment intensity moderated the grouping effect. Overall treatment intensity yielded stronger treatment results.

Lou et al. (1996) also examined effects of heterogeneous versus homogenous groupings. Low-ability students learned significantly more in heterogeneous groups (d = 0.60). Medium-ability students learned more in homogenous groups (d = 0.51). High-achieving students did not show differential performance across the two groupings (d = 0.09). Across ability groups, homogenous grouping yielded higher *ES*s than heterogeneous grouping (d = .51).

Elbaum et al. (1999) conducted a meta-analysis to determine effects of grouping practices on students with disabilities in grades 1-6. The researchers reviewed 21

intervention studies to determine a most effective grouping format: Student pairs, small groups (i.e., groups of 3-10 students), and multiple grouping formats (i.e., combinations of small groups and student pairs). The mean weighted *ES* was 1.41 for small groups, .40 for pairs, and .36 for multiple grouping formats.

Elbaum et al. (1999) also examined the relative importance of different pairings (peer tutoring, cross-age tutoring, or cooperative partners), the role of student within the pair (e.g., tutor versus tutee), and methodological variables (i.e., study quality). Results indicated that there were no significant ES differences for types of pairings. However, in cross-age tutoring, the *ES*s were higher for students who were tutors (d = .86), whereas *ES*s for those who were tutored were near zero (d = -.07).

Finally, Elbaum et al. (1999) categorized reviewed studies as either higher quality or lower quality based on four methodological variables. These included whether the identification criteria for LD were reported, type of sampling procedure, whether fidelity of treatment was determined, and comparability of treatment and control groups. Lower quality studies yielded higher ESs than higher quality studies (d = .65 for lower quality studies and d = .15 for higher quality studies).

Summary of Small Group Tutoring Reviews

Two meta-analyses of small group tutoring were found. Results indicated small group instruction is effective for at-risk students and students with LD. Lou et al. (1996) determined that small group instruction was most effective when groups consisted of 3 to 4 students, teachers received extra training and extra materials, and the intervention was more intensive. Elbaum et al. (1999) found that small groups outperformed students in

whole classroom instruction by 1.5 standard deviations while those in student pairs only outperformed those in whole classroom instruction by 0.4 standard deviations. These reviews indicate small group instruction is an effective means of intervening with many poor readers. In some cases, it may be more effective than student pairs especially when the groups are composed of 5 or fewer students.

Meta-Analyses and Reviews of 1:1 Versus Small-Group Instruction

Table 5 provides methodological information for the meta-analyses and narrative reviews of 1:1 versus small-group instruction. Table 6 summarizes the relevant findings.

A meta-analysis was found comparing individual versus small group instruction. Two additional reviews examined this contrast, but without reporting of *ES*s.

Swanson (1999) conducted a meta-analysis to answer several important questions. For this chapter, the pertinent question he explored was whether certain models of instruction are broadly effective across word recognition and reading comprehension or whether effects of the models are domain specific. Swanson reviewed 92 studies. All included a measure of real-word recognition and/or reading comprehension and a control group or within design. Participants in the studies were LD. They all scored above a standard score of 84 on an intelligence test, the treatment groups received instruction above and beyond the typical classroom instruction, the studies were written in English, and *ES*s could be derived from each.

Swanson (1999) used exploratory analyses to determine whether group size significantly predicted word recognition and reading comprehension scores. Results of a hierarchical regression indicated that adding small group and individual instruction into

Table 5

Methodological Information for Meta-Analyses and Narrative Reviews of 1:1 Versus Small-Group Instruction

Citation	Number of studies	Grade level	Risk Status	Inclusion Criteria	Inter-rater Agreement for Inclusion Criteria
	Meta-analyses and Narrative Reviews				
Swanson (1999)	92	K-12 and adults	LD	1. Outcome measures were real word recognition and /or comprehension 2. must have had a control group 3. included participants with LD 4. information available to compute effect sizes 5. participants were children and adults with average intelligence 6. treatment group received instruction beyond the typical classroom instruction. 7. study written in English	80-95%
Polloway et al. (1986)	20	children and adults	varied	not reported	not reported
Torgesen (2004)	6	K-2	at-risk	not reported	not reported

Table 6

Relevant Findings for Meta-analyses and Narrative Reviews of 1:1 Versus Small-Group Instruction

Citation	Dependent Variable(s)	Effect Size
	Meta-analyses and Reviews	
Swanson (1999)	1. Individual Instruction 2. Small Group Instruction	Word Recognition .03 (1:1) 1.21 (small group) Reading Comprehension .07 (1:1) 4.20** (small group)
Polloway et al. (1986)	Narrative review	Not reported
Torgesen (2004)	Narrative review	Not reported

the model did not significantly raise the r^2 value. However, interactive instruction within a small group did significantly contribute to reading comprehension scores. Neither small group nor individual instruction contributed to the word recognition scores. These analyses suggest that 1:1 instruction and small group instruction are equally effective in word recognition studies. Small groups were found to be more effective than 1:1 instruction in reading comprehension studies.

Swanson (1999) reported that methodological variables mediated outcomes. Younger students had higher *ES*s than older students; interventions in settings outside of the classroom yielded higher *ES*s than when the intervention occurred in the classroom; and experimental measures yielded higher *ES*s than standardized measures.

The second review of 1:1 instruction versus small group instruction was conducted by Polloway, Cronin, and Patton (1986). Twenty articles were reviewed to determine whether 1:1 instruction is superior to group instruction. *ES*s were not calculated. The authors reviewed only studies in which there was a direct comparison of 1:1 versus small group instruction. Participants in the studies represented both students with severe disabilities in residential settings as well as students with mild disabilities in the public schools. The authors examined the importance of both populations and outcome measures to reading outcomes.

Across the studies they reviewed, Polloway et al. (1986) determined that for students with mild disabilities, group and individual reading interventions were equally effective.

The authors concluded that group instruction is as effective as 1:1 instruction. However, many studies in Polloway et al's (1986) review did not look directly at reading

interventions, especially when the populations consistent of students with profound and moderate mental retardation. However, reading achievement was the focus of 16 of the 20 articles. Again, there were no *ES* calculations, which limits conclusions that may be drawn from the research.

The third review regarding 1:1 versus small group instruction was conducted by Torgesen (2004). Its purpose was to review best practices in preventing early reading failure. Torgesen defined "best practices" as those that provided students with classroom instruction, early screening of reading difficulties, and extra instruction matching the students' needs. Further, the instruction should be explicit, intensive, and supportive. Torgesen then reviewed studies of interventions characterized by these attributes to determine the failure rates of early intervention. Failure was defined as not reaching the 30^{th} percentile in word-reading ability. Of six studies he reviewed, four implemented small group instruction (3-8 students), two implemented 1:1 instruction. The failure rates were higher for the two studies implementing 1:1 training as compared to those implementing small-group instruction (average failure rate for small-group studies was 20% as compared to 39% for individual instruction). However, further analysis of the data indicated that failure rates associated with the two approaches in the general student population would be quite similar: 4% for small groups; 5% for individual instruction. Importantly, word-identification, not reading comprehension was the common outcome measure across these studies. It might be assumed that failure rates are higher when assessing more advanced reading skills beyond the word level. However, for purposes of this chapter, the failure rates suggest that small group instruction is as effective as 1:1 instruction for preventing reading failure.

Summary of Meta-Analyses and Reviews of 1:1 Versus Small-Group Instruction

The one meta-analysis comparing small-group and 1:1 instruction (Swanson, 1999) indicated that small-group instruction was just as effective as 1:1 instruction in producing gains in word recognition and reading comprehension when the intervention focused on word recognition. However, small groups were more effective in advancing reading comprehension. Polloway et al. (1986) reviewed 20 studies and determined that small groups were as effective as 1:1 instruction for students with moderate mental retardation and students with mild disabilities such as LD. However, for students with profound mental retardation, group instruction was more effective. Torgesen (2004) found a similar pattern. That is, small-group instruction was just as effective as 1:1 instruction.

Direct Comparison of Small Group and 1:1 Instruction

Baker et al. (1990) examined the effectiveness of 1:1 tutoring versus 1:3 tutoring. Six students with LD were chosen to participate in the study. All six students were males in the fifth grade. They were placed into two groups of 3 students. Two teachers were randomly assigned to each of the groups. The students were instructed using the SRA Spelling Mastery program and the SRA Fractions program which were designed for use with small groups. The programs were altered by the authors to make the wording more consistent with a 1:1 format. The programs were implemented 1 hour each day for 4 weeks. One of the groups received group instruction while the second group was instructed one-on-one for 20 minutes. During the 1:1 condition, the other two students in

the group were provided with worksheets from the classroom that were not part of the SRA programs.

The following data were collected: the number of minutes required to reach mastery on each task in the program and the amount of time students were actively engaged in their work. Students in the 1:3 spelling instructional group required a mean of 570 minutes for mastery, whereas those in the 1:1 condition required 324.7 minutes. Students in the 1:3 fractions instructional group required an average of 253.3 minutes to mastery while students in the 1:1 condition required 201.8 minutes.

Results indicated that the students in the 1:1 condition learned at a faster rate than those in the 1:3 condition. However, further analyses indicated that the amount of teacher time required was much greater for the 1:1 condition because teachers worked with each child individually. For fractions, total instructional time for the 1:1 session was 605 minutes while the same instruction for the one-to three session was 247.5 minutes. For spelling, the total instructional time was 598 minutes versus 244 minutes. So, even though students learned at a quicker pace, the amount of instructional time needed was much greater for the 1:1 condition. There were no differences between time on-task for the 1:1 and 1:3 conditions.

Schumm et al. (2000) conducted two studies to determine teachers' perceptions and practices of grouping and the effects of teachers' grouping practices on students' attitude, academic progress and social progress. For Study 1, 29 third grade teachers were interviewed and observed to determine their practices and attitudes about grouping in their classroom. Results indicated that teachers most use whole class instruction followed by individual activities, group activities and then student pairs. Of the 29 teachers, only 3

used same-ability grouping in their classroom. Four used mixed-ability grouping. Overall, teachers did not differentiate instruction for children but generally used the same method regardless of individual student's ability.

Schumm et al.'s second study (2000) was conducted to determine the effects of whole class grouping practices on high, average, and low achieving students educational and social progress. Twenty-one teachers from Study 1 were asked to choose two students for the following categories: high achieving (HA), average achieving (AA), low achieving (LA), and learning disabled (LD). One hundred and forty seven students were given the following measures: The decoding and comprehension subtests of the Kaufman Test of Educational Achievement, the Piers-Harris Children's Concept Scale, and the Elementary Reading Attitude Survey. For the reading measures, students in the HA group progressed the most from Fall to Spring. Those in the AA group made significant progress in decoding but not in comprehension. Those in the LA and LD group made no significant progress the entire year. For self-concept, there were no significant changes for any of the groups. The students' scores on the reading attitude measure were combined for all 4 groups. The students' attitudes about reading declined significantly over the school year.

In sum, Schumm et al. (2000) found that third grade teachers most often used whole class instruction in the classroom. High achieving students progressed in decoding and comprehension significantly while average achievers only progressed in decoding. Whole-class instruction was not effective for students with learning disabilities and those labeled as low achievers.

Thurlow et al. (1993) examined the effects of group size on the academic achievement of 139 students in grades 1 through 6 who were diagnosed with LD (n=114), EBD (n=19), or MR (n=6). All students were receiving special education services in 27 different schools with 54 different teachers. Trained observers used The Code for Instructional Structure and Student Academic Response (CISSAR). Eight composite variables were observed. These were academic activity, nonacademic activity, paper tasks, teacher tasks, academic engaged time, active responding time, task management time, and inappropriate response time. Five different grouping structures were used: 1:1, 1:3, 1:6, 1:9, and 1:12 in the special education classrooms.

Results indicated that students in the 1:1 and 1:3 conditions gave more academic responses than those in larger groups. In addition, students in the 1:1 group were more engaged than students in larger groups. Teachers spent significantly less time in task management in the 1:1 groups. Inappropriate behaviors were highest in the 1:12 group. Hence, smaller student-teacher ratios were important in terms of time spent on task, teacher management of students and student behavior. However, this study did not examine the effects of these variables on student achievement.

The final direct comparison of 1:1 versus small group instruction was submitted for publication in 2001. However, a published version of the paper could not be found. Hence, this research study will be referred to as “Anonymous” (2001). Three different grouping formats were examined: 1:1, 1:3, and 1:10. Participants were 77 second graders who were struggling with reading. Among these students, 74% were English Language Learners of Hispanic origin. The students were in 10 different schools and all students were nominated by their teachers as struggling readers and had failed the second grade

state level screening. Students were assigned to groups based on the DIBELS phoneme segmentation task. Based on their scores, students were given a rating of high, medium and low. Equal distributions of high, medium, and low rated students were assigned to 1:1, 1:3, or 1:10 conditions.

Students were assessed before and after treatment and then 5 weeks after intervention on the WRMT-R Word Attack and Passage Comprehension, the Test of Reading Fluency (TORF), and DIBELS phoneme segmentation and nonsense word reading. The intervention focused on five areas: fluency building, phonological awareness, vocabulary, comprehension strategies, and word analysis. Students were tutored for 30 minutes each day for 13 weeks.

Students in the 1:1 and 1:3 condition outperformed students in the 1:10 condition in passage comprehension. For phoneme segmentation and reading fluency, the 1:1 group outperformed the 1:10 condition. There were no differences between 1:3 and 1:1 or 1:3 and 1:10. There were no differences between the groups on word attack performance. Generally, as in the Thurlow et al. (1993) study, smaller groups were generally more effective than larger groups. However, 1:1 was not superior to 1:3 indicating that 1:3 is just as effective for academic outcomes and student engagement.

Summary of 1:1 Versus Small Group Instruction

Four studies directly compared 1:1 instruction with group instruction. Overwhelmingly, small groups of 3 to 5 students were found to be as effective as individual instruction for students struggling with reading skills. Baker (1990) found that students mastered fractions concepts and spelling faster when taught individually.

However, the amount of teacher time required was much greater for 1:1 instruction. Schumm et al. (2000) compared high, middle, and low achievers, as well as those with LD, in academic achievement, reading attitudes, and self-concept when instructed in a large group format. Their results indicated that whole-group instruction was only effective for the high and average achievers for reading progress and reading attitudes. Low-achievers and those with LD need more intensive instruction than is provided in the general education classroom. Thurlow (1993) examined classroom environment variables that affected achievement in different group structures. Their results indicated that students in 1:1 and 1:3 instruction gave more academic responses than those in 1:6, 1:9, or 1:12 groups. In addition, students in the 1:12 instruction exhibited the most problematic behaviors during instruction. Of the four studies found, "Anonymous" (2001) was the only primary study that compared pre and posttest scores on academic measures using group size as the independent variable. Anonymous' results indicated that 1:1 and 1:3 instruction was more effective than 1:10 instruction in the areas of phoneme segmentation, reading fluency, and decoding.

Implications for Future Research

The results of this review indicate that small group instruction is effective for teaching reading skills. There are several research questions that have not been answered in this review. First, how effective is 1:1 versus 1:3 instruction when compared to research-based classroom instruction? Much of the research on group size compares one to one versus small group instruction but the comparison group is often a no-treatment control. Second, does intervention have to be individualized for every student or can

school personnel implement a standardized approach? These questions are very important as we move to a response to intervention model of special education placement procedure. With new criteria, programs such as PALS are to be implemented in the general education classroom. It is important to examine the effect of tutoring programs on students reading skills that aren't making progress in the classroom. Second, what are the characteristics of a good reading program. While the National Reading Panel identified the five necessary building blocks of teaching reading, there is still not hard evidence on the effects of individualizing for every student. A standardized approach is much easier implemented in that it requires much less training and clinical judgment by those implementing the intervention (i.e., teachers in the schools). The present study was designed to specifically address these questions in a careful, systematic way.

CHAPTER III

METHODS

Participants

This study was part of a larger study of the effects of PALS (see Fuchs et al., 2001; Mathes et al., 1998) on the reading performance of second-grade students. PALS is a class-wide reading approach in which students work cooperatively in pairs. Students learn and review sounds, practice decoding and blending decodable words, read sight words, and read controlled and uncontrolled text. Each participant had received about 17 hours of class-wide PALS during fall semester of second grade. Forty classrooms in the larger study were assigned randomly to one of three treatments: PALS, PALS + Fluency, or PALS + Comprehension. There were 10 classrooms in each condition. Another 10 classrooms served as controls. Controls did not participate in this study. We directed our intervention to the second-grade children who failed to respond to the class-wide PALS program during fall semester. Students were identified as nonresponders in stages. First, students were identified as at-risk for reading failure. Second, at-risk students were monitored from October until December. Third, students were identified as nonresponders based on the monitoring data. These stages are described below.

Identification of the risk pool. At the beginning of the school year, four to eight of the lowest performing children were identified as at-risk for reading problems from each of 30 treatment classrooms in the larger PALS study. Teachers were given a rank-ordered list of their students' performance on the Word Identification subtest of the Woodcock

Reading Mastery Test-Revised (WRMT-R; Woodcock, 1987). Teachers were then asked to designate 4 high achievers, 4 average achievers, and 8 low achievers. Some teachers did not have enough students to designate 8 low achievers. As a result, across the 30 classes, 214 students were considered "at risk" for nonresponiveness to the PALS program.

Monitoring progress of the risk pool. Research assistants (RAs) in the PALS study monitored students using curriculum based measurement reading passages (CBM; Fuchs, Hamlett, & Fuchs, 1990) and PALS chapter tests once every week for 5 weeks. The PALS chapter tests were created to directly measure whether sounds and words had been learned. The chapter tests had the same format as the PALS lesson. The CBM reading passages were written at the second grade level. Students were asked to read two passages each for one minute. Performance on the chapter tests was expressed as a percent correct; performance on the CBM passages was expressed as the number of words read correctly in one minute.

Identification of nonresponders. In December, the monitoring data were analyzed to determine which from the at risk pool had not responded to the PALS program. First, level and slope calculations were calculated on the CBM passages. The level was the mean of the students' last two monitoring scores (i.e., words correct per minute; wcpm). A linear regression between wcpm and monitoring sessions was used to calculate the slope. The level and slope needed to reach 75 wcpm by the end of second grade was then computed for each student. This is considered a minimum level of reading competence for second grade (Fuchs & Deno, 1992; Fuchs, Fuchs, Hamlett, Walz, & Germann, 1993; Hasbrouck & Tindal, 1992; Hosp & Fuchs, 2001; Marston & Mangnusson, 1988). A

proportion was then calculated that reflected the students' actual slope in comparison to their required slope to reach 75 wcpm by year's end. I identified students whose slopes were less than 35% of that needed to reach 75 wcpm at the end of treatment.

Next, percentages were calculated for each child on the last PALS chapter test administered. I identified all students who had scores of less than 90%. Students were identified as nonresponders if they met two criteria: (1) their actual slope was less than 35% of the slope needed to reach 75 wcpm, and (2) their percentage correct on the last PALS chapter test administered to them was less than 90. On these bases, 65 students were identified as unresponsive to the PALS program. One student moved before assignment to groups occurred, leaving 64 students for assignment to one of four tutoring conditions.

Assignment to Tutoring Group. The 64 students were assigned randomly to: (1) remain in PALS, (2) standardized 1:1 tutoring, (3) standardized 1:3 tutoring, or (4) individualized 1:1 tutoring. The number of students from each PALS treatment (i.e., PALS only, PALS + Comprehension, PALS + Fluency) that was assigned to tutoring groups can be found in Table 3.2. Assignment to tutoring groups was accomplished in a three-step process. First, a matrix was created that contained the total number of students in Title I and non-Title I schools who had been identified as nonresponders. I attempted to place an equal number of students in each tutoring group based on the type of school. Table 8 lists the number of students placed in each tutoring group by type of school. Because tutoring group was used as the unit of analyses, rather than individual students, the total number of students placed in the 1:3 condition is in parentheses. So, for

example, there were seven groups of students participating in 1:3 for Title I schools (see Table 7).

Table 7

Number of Groups (and Students) by Tutoring Group and PALS Treatment

	1:3 (standardized)	1:1 (standardized)	1:1 (individualized)	PALS
PALS	3 (9)	2	4	2
PALS + Fluency	6 (17)	4	4	4
PALS + Comp.	3 (8)	3	2	4

Table 8

Number of Groups (and Students) by Tutoring Group Placed in Each Type of School

School Type	1:3 (standardized)	1:1 (standardized)	1:1 (individualized)	(PALS)
Title I	7 (21)	6	7	4
Non Title I	4 (12)	4	4	6
Totals	11 (33)	10	11	10

Next, the number of nonresponders for each teacher was calculated. Another matrix was created that contained the number of nonresponders in each tutoring group

from each school. Table 9 lists the number of students from each school who were placed in the tutoring groups.

An important consideration when assigning students to tutoring groups was whether a particular teacher had enough students for the 1:3 tutoring groups. Eleven teachers did not have three nonresponders in their classroom. Therefore, I was unable to place any students in those classrooms in the 1:3 tutoring groups. I randomly assigned students to the 1:3 condition at the teacher level. For example, if a teacher had five nonresponders, three of those students would be randomly chosen to be in a group of three. For the other three treatment conditions, students were randomly assigned by school. In the previous example, the two students who were not placed in the group of three were placed with all the other nonresponders from their school and assigned to one of the other three treatment groups.

During the study, 4 students moved and one student was not tutored due to scheduling conflicts. This left 11 treatment groups of 3:1 (with 31 students); 9 groups in standardized 1:1 (9 students); 9 groups in 1:1 individualized (9 students); and 10 students in PALS. Two students in the 1:3 treatment moved. Because the students moved so late in the year, no effort was made to find a third student. Therefore, two groups were groups of two for the last few weeks of treatment. This left a total of 59 nonresponders in the study.

Table 9

Number of Students in Each Tutoring Group by School

	1:3 standardized	1:1 standardized	1:1 individualized	PALS
School 1	2 (6)	2	2	2
School 2	0	1	1	1
School 3	1 (3)	1	0	2
School 4	1 (3)	0	1	1
School 5	1 (3)	0	1	0
School 6	2 (6)	2	2	2
School 7	1 (3)	2	1	1
School 8	3 (9)	2	3	1

Table 10 contains the average performance of students on the monitoring measures by group based on the October to December monitoring data. There were no significant pretreatment differences between the groups on CBM level, $F(3,41)=7.48$, $p>.05$, CBM slope, $F(3,41)=.757$, $p>.05$, or Word Identification, $F(3,40)=.203$, $p>.05$.

Table 10

Descriptive Statistics for Monitoring Measures (October to December) by Tutoring Group

	1:3 standardized n=11		1:1standardized n=9		1:1 individualized n=9		PALS n=10	
Measure	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)
CBM								
Level	19.75	(0.34)	20.28	(0.63)	20.75	(0.47)	24.23	(0.20)
Slope	0.63	(0.67)	0.63	(0.67)	0.47	(0.86)	0.20	(0.78)
Chapter Test	71.17	(15.06)	78.16	(10.20)	76.37	(19.87)	83.01	(7.00)

All nonresponders were compared on several important demographic characteristics. These included sex, ethnicity, English Language Learner (ELL) status, socioeconomic status, special education status, and whether the teacher planned to retain the student in second grade. Chi-square tests indicated that the groups had equal numbers of boys, students in ELL, students who received free lunch and special education, and those who repeated second grade. There was a significant chi-square for race, indicating that the treatment groups did not have equal numbers of students that were Caucasian, African-American, or of other descent.

Research Staff

Eleven RAs participated in the large-scale second-grade PALS study. Of these, a subset of 6 RAs was chosen as tutors for this study based on their previous work with children. The other five RAs continued their work in the classrooms assisting teachers in implementing PALS and monitoring all nonresponders. Four tutors were doctoral students in Special Education and two were masters students in Special Education.

Treatment

Tutoring sessions. All students placed in the 3 tutoring groups received instruction in phonological awareness, decoding, sight word recognition, reading fluency, and writing. Students were tutored 3 days a week for 40 minutes over a 12 week period by a trained RA. The tutoring activities were organized into 3 units with 8 sets in each unit. Students were placed in sets based on their last PALS chapter test. The test was examined to determine what sounds and words the student had not yet learned. The tutors were instructed to use the first week of tutoring to determine whether students were placed appropriately. The tutoring sets increased in difficulty as the students progressed through each set. A scope and sequence for the tutoring activities can be found in Appendix 1. Table 11 lists each of the tutoring activities and the time spent on that activity for each unit.

Table 11

Time Spent on Each Tutoring Activity

	Unit 1	Unit 2	Unit 3
Saying Sounds	5 minutes	3 minutes	3 minutes
Decodable Words	15 minutes	10 minutes	10 minutes
Sight Words	5 minutes	5 minutes	5 minutes
Writing Sentences	0 minutes	5 minutes	5 minutes
Reading in Text	15 minutes	17 minutes	17 minutes

Standardized tutoring. Students in both the standardized 1:1 tutoring group and the standardized 1:3 tutoring group received the instructional sets at a scheduled pace. Students were tutored in each set for one week (i.e., three sessions).

In the first tutoring activity, saying sounds, the student(s) were shown letter cards and asked what sound the letter made. At the beginning of the session, the tutor introduced new sounds by pronouncing the sound and asking the student(s) to repeat the sound. Those in the 1:3 tutoring group said the sounds together. If a student incorrectly produced a sound, the tutor would model the correct sound, and ask the student(s) to repeat the sound again. The sound was then placed in the “incorrect pile” and, after the students completed an entire round of sounds, the sounds that had been missed were reviewed again. The student(s) then practiced all of the sounds again. When they had correctly produced all of the sounds, they marked five points on a special point sheet. The point sheet had 200 spaces to mark. The student received a sticker after every 25 points.

In the 1:1 tutoring group, the tutor continued in this manner until the time was up. For the 1:3 tutoring group, the tutor provided each child with individual practice. This task was completed in the same way across all three units. In Unit 1, this activity lasted for 5 minutes, while in Units 2 and 3, saying sounds lasted 3 minutes.

The second tutoring activity was decoding words. In Unit 1, students were given 15 minutes to complete this activity. Each set contained eight words that contained all of the sounds that had been practiced in that set. First, the tutor said all the sounds in a word, approximately one second apart and told the students to “Guess my word”. The students then said the word and said each sound in the word. The student was then shown the word on a card with a dot under each sound. The student was told to point to the dots and sound the word out, and read the word fast. If the student performed any of the steps incorrectly, the tutor modeled the correct response and placed the word in the “incorrect pile” to be reviewed again. When the student blended, sounded out, and read each word correctly, he could mark five points on the point sheet. In the group of three, the students responded together, and were then given individual practice.

In Units 2 and 3, the decodable section of the tutoring changed. The time was reduced to 10 minutes, and the students no longer played “Guess my word.” Instead, students were shown the word card, asked to say the sounds in the word, then sound out the word and read it fast. The students then opened their notebooks and wrote the word. Combining writing with decoding and phonological awareness instruction has been found to increase success in a reading program (Ehri, 1989). If the students made any mistakes on any step, the tutor modeled the correct response, placed the word card in a different

pile, and reviewed the word again. In these two Units, the students marked two points after each word that was written.

When the students responded correctly to all the words, the tutor played a game with the students using the sight words. For example, the tutors were provided game cards that were duplicates of all the words. The tutor could then play a game such as Memory or Go Fish with the student. Other games included timed pick-up games in which the student would pick up as many words as they could as the words were dictated by the tutor.

The third tutoring activity involved practicing sight words for 5 minutes. First, second, and third-grade Dolch words were placed on small cards. The students read each sight word. If one was missed, the tutor modeled the correct word and had the student repeat the word. This method remained constant throughout the three units. Again, the same types of games as described in the decodable word section were played with the sight words.

The fourth tutoring activity was writing sentences with the sight words for five minutes. Students in Unit 1 did not do this activity. In Units 2 and 3, the student or the tutor chose a sight word, and the student wrote a sentence using that word. The student then read the sentence to the tutor and marked five points. The student was encouraged to use invented spelling for unknown words, but the sight word had to be spelled correctly.

The last activity of the tutoring session involved reading in connected text. In Unit 1, this activity lasted 15 minutes, and in Units 2 and 3, the students read stories for 17 minutes. Reading stories included two parts: (1) reading short stories with controlled text, and (2) Partner reading.

Short stories were created for each set that contained controlled text. In general, only words and sounds that had been taught and practiced were used in the stories with the exception of the "rocket words." Because all of the stories were taken from the PALS lessons, there may have been some sounds or words that the student had not yet learned. If the student had difficulty with these words, the tutor would help the student by modeling the word and having the student repeat it.

The tutor would first introduce new "rocket words" for the story. These were words that contained sounds or features that the student had not yet learned. Those words were placed in the story to make the story more interesting. The tutor modeled reading the story for the student, and then the student read the story. In the one-to three condition, the story was divided, and each student read his or her part. If the student missed a word, the tutor would model the correct word and have the student repeat it. The students then read the story three times for one minute each (each student read the story only two times in the 1:3 tutoring group due to time constraints). Their highest score was placed on a graph, and a goal was set to read 2 more words correct than their highest score. On subsequent days, if students met or passed their goal, a star was marked on a star chart. After four stars were marked, the student was able to pick a treat from a treat bag. Treats included items such as pencils, erasers, or pencil grippers.

Partner reading involved stories chosen from the students' books in their class. The books were on the students' instructional level. The tutor read a page first and then the student read the same page. Each book was read at least three times before a new book was chosen. In Unit 3, a comprehension component was added. The student was asked to summarize the story after one or two pages had been read and retell the story at

the end. Repeated reading, summarizing, and retelling have been shown to increase reading comprehension (see Mastropieri & Scruggs, 1997).

Individualized tutoring. The individualized tutoring group differed from the standardized tutoring group in several ways. The activities described in standardized tutoring were initially implemented exactly the same with the exception that a mastery component was built in to the tutoring. At the beginning of every activity, the tutor checked for mastery on the words and sounds in that particular set. Once the student had mastered all sounds and words, he or she was moved to the next set. In standardized tutoring, the students were moved to the next set after three sessions regardless of whether they had mastered that set. After the first two weeks of tutoring, all tutors met weekly to discuss each child in the individualized condition. Each week, the tutor administered two first-grade CBM passages. Performance was graphed and discussed at each meeting. If a child was making inadequate progress, defined by not making progress toward the 75 wcpm goal for the end of the year, the group brainstormed how to improve the child's performance. One child had difficulty remembering the sight words. The tutor highlighted all of the sight words in the story. Importantly, not every student needed modifications. Three students made adequate progress with no modifications being made.

Another important distinction between standardized and individualized tutoring is that the tutor could spend more time on activities that were problematic for the student and less time on tasks that were clearly mastered. For example, in standardized tutoring, a student must spend 3 minutes on saying sounds, whereas in individualized tutoring, the tutor could move on as soon as the student had mastered all of the sounds. This would

leave more time for other tasks that may be problematic. If there was extended time left at the end of the session, the student often read connected text.

Control group. Students randomly assigned to the control group remained in the PALS class-wide treatment. Teachers were permitted to move students back lessons to provide more practice on particular skills. Control students were also continually monitored for the entire school year to measure their progress in reading.

Measures

Pretest Measures

All participants in the PALS study were given the following pretest measures in October, 2001. These included measures of rapid naming, phonological awareness, reading words, spelling, fluency, and comprehension. All pretesting was conducted in a one-to-one session with a trained RA.

Rapid naming. A Rapid Letter Naming (RLN) test was given to determine the speed in which students could recognize letters. The RLN test has been used as a selection tool in previous PALS studies (e.g., Fuchs et al., 2001) because it is a strong predictor of future reading ability (e.g., Torgesen, Wagner, & Rashotte, 1997). All letters of the alphabet, both upper and lower case, were presented randomly in black type on a sheet of paper. The student was instructed to name the letters as quickly as he/she could in one minute. The score was recorded as the number of letters named correctly in one minute. If a student finished the test before the minute was up, the score was prorated

using the following formula: number of seconds it took to finish the test divided by the number of letters named correctly multiplied by 60.

Phonological awareness. The Elision subtest of the Comprehensive Test of Phonological Awareness (CTOPP; Wagner, Torgeson, & Rashotte, 1999) was given to measure phonological awareness. Students are told to say a word, and then say the same word without one of the phonemes (e.g., say 'meat'; now say 'meat' without the /m/. The test was discontinued after the student missed four items in a row. The score was recorded as the number correct. The Elision subtest has a test-retest reliability of .88 and moderately correlates with the Word Identification (.73) and Word Attack (.74) subtest of the Woodcock Reading Mastery Test-Revised (WRMT-R; Woodcock, 1987)

Reading words. The Word Identification and Word Attack subtests of the Woodcock Reading Mastery Test-Revised (WRMT-R; Woodcock, 1987) were given to measure word recognition and decoding skills. On the word attack subtest, the students are asked to read words that are not really words (e.g., ift). This measures the students' ability to decode unknown words. The test is discontinued when the student misses six consecutive items. On the Word Identification subtest, the student is asked to read words of increasing difficulty. The test is discontinued when the student misses six words in a row. The WRMT-R is a standardized, norm-referenced test. The scores on the WRMT-R Word identification and Word Attack subtests correlate highly with other tests of reading, and internal consistency exceeds .80.

Spelling. The spelling subtest of the Wechsler Individual Achievement Test (WIAT; Wechsler, 1992) begins by asking students to write letters and letters that make a particular sound. The student is then given a word to spell, a sentence containing the

word, and the word is repeated. The student is given 10 seconds to spell each word. The test is discontinued when the student misses five words in a row. The WIAT has a moderate to high correlation with other achievement tests (.70 to .85) and has a high test-retest reliability (.94).

Fluency/Comprehension. A passage from the Comprehensive Reading Assessment Battery (CRAB; Fuchs, Fuchs, & Hamlett, 1989) was given to the students. The passage is a 400 word traditional folk tale that is written on the second grade level. The students were instructed to read the passage quickly and correctly. The number of words read correctly in one minute and the number of words read correctly in three minutes was recorded. The student is then asked 10 questions about the passage. Test-retest reliability for the CRAB ranges from .93 to .96. Concurrent validity with the Stanford Achievement Test (SAT) Reading Comprehension subtest was .91 (Fuchs, Fuchs, & Maxwell, l988).

Monitoring Measures

During the first five weeks of PALS treatment implementation, the 214 students who had been identified as at-risk for reading failure were administered weekly tests to monitor their progress in reading. These measures included weekly chapter tests and CBM passages. After the 64 nonresponders were identified using these tests, all 214 at-risk readers were administered the CBM passages once every two weeks. All tests were administered in a one-to-one session conducted by trained RAs.

Chapter tests. Chapter tests were given during the last three monitoring sessions. The chapter tests were developed to directly measure the sounds and words that the

students had learned in PALS. Five chapter tests were developed that covered up to Lessons 8, 11, 14, 17, and 20. Students were given the test that most closely matched the lesson they were on in the classroom. For example, if a student's class was on lesson 13, the child would be given the chapter test for Lesson 11. No student was given any chapter test that was above the lesson they had reached in their classroom. The tests were composed of only the sounds and words that had been learned in the lessons. The chapter tests were cumulative and untimed. The score was recorded as the number of sounds and words read correctly.

CBM. Every week, two curriculum-based reading measures were given to all students. These measures were developed at Vanderbilt University (Fuchs et al., 1990). The passages are between 1.5 and 2.5 grade levels. Students read passages for one minute each and the number of words read and the number of words read correctly are recorded. The average number of words read for the two passages was used as the students' score.

Midpoint Testing

In December, all 214 at-risk students were readministered the WRMT-R Word Attack and Word Identification subtests to evaluate their decoding and word identification skills following their participation in 17 hours of PALS treatment in the classroom. The students were tested by the RAs in a one to one session.

Posttest Measures

All 214 nonresponders in the PALS study were administered all posttest measures. These measures included all of the pretest measures and a CBM measure described below.

CBM. Two additional second-grade CBM passages were given at the end of the year. One passage was given to test fluency; the other to test fluency and comprehension. Questions were written for each of the passages by the Principal Investigator of the study. The questions included three open-ended questions and 10 multiple-choice questions. The number of words read correctly in one minute was calculated for each passage.

Additional Nonresponder Testing

In addtion to the posttesting, three other tests were given to all 59 nonresponders. These were the Vocabulary and Matrix Reasoning subtests of the Wechsler Abbreviated Intelligence Scale (WASI; Psychological Corporation, 1999), the Digit Span subtest of the Wechsler Intelligence Scale for Children-Revised (WISC-R; Wechsler, 1974), and the Colorado Perceptual Speed Test.

WASI IQ. An estimated intelligence score can be derived by administering two subtests of the WASI. On the Vocabulary subtest of the WASI, the student is asked to define words of increasing difficulty. Each response is scored as either a 0 (incorrect), 1 (partially correct), or 2 (completely correct). The test is discontinued when the student scores a 0 on five consecutive items or when the child has completed all the items for his or her age range. Internal consistency reliability coefficients range from .86 to .93 for the Vocabulary subtest. The Matrix Reasoning subtest requires the student to determine what shape is missing in a series of pictures. The child chooses the best answer from several choices. Each item is scored as a 1 (correct) or 0 (incorrect). A ceiling is established when the child misses four items in a row or receives four 0's on five consecutive items.

Using these two subtest, an estimated intelligence score is obtained. The internal consistency reliability coefficient for the Matrix Reasoning subtest is .96.

Digit Span. The Digit Span subtest of the WISC-R (Wechsler, 1974) is a supplemental test that assesses verbal memory. For Digits Forward, the examiner says a series of numbers that the child must repeat back in the same order. For Digits Backward, the examiner says a series of numbers, and the students must repeat the numbers back in reverse order. Each item consists of two trials. Each trial was scored as a 1 (correct) or a 0 (incorrect). The test was discontinued when a student missed both items on a trial. Reliability coefficients for the Digit Span subtest range from .71 to .84.

Colorado Perceptual Speed Test. The Colorado Perceptual Speed Test (CPST) assesses the speed with which the students can match a random string of alphanumeric figures. The test consists of the target item and four similar strings. The student must match the target item with one of the four strings by circling the string that matches the target. The test has 30 test items and the student completes as many as possible in 60 seconds. The total score is the number of correct responses.

Procedures

Pre- and Posttesting. Prior to pretesting in October, 2001, 10 RAs were trained on all pretest measures in one four hour training session. All RAs observed the tests being administered and practiced administering the tests under the supervision of the project coordinator. When everyone was comfortable with each test, an interrater agreement session was held. Two project coordinators administered each test and the RAs all scored

separate protocols. Interrater agreement was calculated by comparing each answer on each test to a project coordinator's protocol. Number of agreements was divided by number of agreements plus disagreements, and then multiplied by 100. No RA scored below 90% on any test.

Following pretest training, parental consent forms were sent home with all students in the 40 classrooms (i.e., 10 PALS only classrooms, 10 PALS + fluency classrooms, 10 PALS + comprehension classrooms, and 10 control classrooms). Signed consent forms were returned for 739 out of 759 students.

Testing sessions were divided into two sections to help prevent student fatigue. During the first session, students were administered the Rapid Letter Naming subtest and then Word Identification on the WRMT-R. The third test for the first round was randomly chosen from the remaining four tests. On the second day of testing, the remaining three tests were administered in random order.

For each testing session, examiners spent several minutes establishing rapport with each child. Testing did not begin until the examiner believed that the child was comfortable and relaxed. Rapport was established by talking with the student about how they liked school, their favorite animal, color, or other topics of interest to the child.

In April, 2002, the PALS project coordinator conducted another training session to ensure that all RAs remembered how to administer all tests, and to instruct them how to administer the new CBM test that was added to the posttest battery. Training took place in two, 2-hour sessions. Again, all staff members observed and practiced testing procedures. Inter-rater agreement was collected for all tests in the same way described in the pretest section. No RA was below 90%.

Immediately following posttest training, RAs tested each student in two, one-to-one testing sessions. The examiners only tested children with whom they were familiar (i.e., had assisted the teacher in the classroom at some point during the year). However, examiners did not test any child whom they tutored.

All posttests were given numbers and randomly ordered for administration for each child. The only exception was that the CBM fluency probe was always given at the beginning of the second session, and the CBM comprehension probe was always given at the end of the second session. The two CBM passages were randomly ordered so that one child would get one story for comprehension, while another child got that story for fluency. All examiners made certain that the children were comfortable and relaxed prior to the start of the testing session.

Monitoring progress of the risk pool. Following pretesting, the project coordinator trained all RAs to administer the CBM and chapter tests for monitoring the risk pool. One, two-hour training session was held in which staff observed and practiced test administration. An interrater agreement session was determined. Agreement for CBM was 99.8; for chapter tests, 98.5.

For the first five weeks of PALS implementation, RAs monitored the 4-8 students in each class who had been designated by their teachers as nonresponders. Monitoring was conducted one day per week. The RAs were told told to make sure that each child received the correct chapter test based on the lesson that the teacher was currently on in the classroom.

After the identification of the nonresponders, based on the monitoring from October to December, the monitoring continued in a different manner. From January,

2002, until April, 2002, students were monitored every other week instead of every week. Only those students who were identified as nonresponders were monitored. Low-achieving students who were making adequate progress in the PALS program were no longer monitored. Also, the chapter tests were no longer given.

Additional nonresponder testing. In April, the 11 RAs were trained in administering the three extra tests given only to the nonresponders. Staff members were given the opportunity to observe and practice administering the tests. Inter-rater agreement was conducted on the Digit Span and Matrix Reasoning tests. All RAs scored 100%. All students were tested in a one-to-one testing condition, and they were not tested until the examiner had established rapport with the child.

Inter-scorer agreement sessions were not conducted for the Vocabulary subtest during training because scoring of this test was performed by the project coordinator and I after the tests were administered. We first scored 10% of the same protocols to establish inter-rater agreement, which was 98%. We then divided the remaining tests and scored them independently.

For the Colorado Pereceptual Speed Test, there was no way to establish inter-rater because the examiner merely had to time the students circling the correct answer. These tests were then scored by one person using a template of correct answers.

Training Tutors

Six RAs were chosen to tutor all nonresponders. Each RA had a least one student/group from each tutoring group. The six RAs were chosen to tutor based on their

previous experience working with children. The RAs who were chosen to tutor were not in classrooms to support any of the PALS treatments and did not monitor any of the students they were tutoring.

In January, 2002, the project coordinator and I conducted a 4 hour training session for all the tutoring procedures. RAs observed the tutoring activities and practiced in pairs with supervision. In addition, a weekly meeting was held to discuss all students in the individualized tutoring group (i.e., their progress and any modifications needed) as well as any other issues that had come up during tutoring.

Tutoring group sessions were conducted three times per week for 40 minutes. Students were tutored during their classroom PALS time; however, seven students were unable to be tutored during PALS due to scheduling conflicts. These students remained in the classroom during PALS but read books, completed teacher-assigned work, or worked on the computer, and so forth.

Treatment Fidelity

Tutoring fidelity was established in two ways. First, in early February, all tutors were observed administering the tutoring activities to another RA not involved in tutoring. A tutoring checklist was developed, which reflected the major tutoring procedures. The project coordinator and I each observed two tutors. The tutor was then asked questions about the differences between 1:1 standardized, 1:1 individualized, and 1:3 standardized. A checklist was completed for each tutor and feedback was given based

on their performance. Overall, fidelity for the tutoring simulations was 97% with a range of 91 to 100%.

Next, in March, all tutors were asked to tape record one session with each student or group. The project coordinator and I listened to 10% of these tapes to establish interrater agreement among ourselves. Our interrater agreement for the tapes was 96%. We then divided the remaining tapes and scored each of them. Overall, fidelity of treatment implementation was 96%. For the 1:1 standardized tutoring, 1:1 individualized tutoring, and the 1:3 tutoring, fidelity was 95%, 97%, and 95% respectively.

Data Analysis

Treatment Results

To compare the relative effectiveness of 1:1 standardized, 1:3 standardized, 1:1 individualized and remaining in PALS, effect sizes were calculated to analyze pre and post test treatment group differences on all reading measures. In addition, growth curve analyses were performed on all six CBM points. Five individual factors were entered into a regression formula to determine the differences that predicted growth and response to instruction. The factors were treatment group membership, initial reading performance on word identification and word attack, WASI IQ scores, free lunch status, and English Language Learners.

CHAPTER IV

RESULTS

First, I report the effect sizes that compare the study groups (1:1 individual, 1:1 standard, 1:3 standard, and PALS) on all reading measures. Inferential statistics were not used due to small sample sizes and lack of power in the study. Second, I describe growth curve analyses performed on the six CBM data points. Finally, I present findings from an exploration of individual differences that predicted growth and response to instruction. These individual differences included initial performance on Word Identification and Word Attack subtests of the WRMT-R, free lunch status, English Language Learner status, and study group.

Descriptive Information

Table 12 provides descriptive statistics by study groups for each of the reading measures administered. For Word Identification and Word Attack, the pretreatment administration was conducted in December immediately before tutoring began. For all other measures, pretreatment administration was in September. As reported in Chapter III, there were no statistically significant differences between study groups at pretreatment on any of the measures. However, again, because of the small number of students in each group, I cannot rule out the possibility of important between-group differences. Table 13 reports the mean gain scores by study group. The table indicates that on most measures students in the PALS group outperformed those in the other study

Table 12 . *Pre and Posttreatment Reading Raw Scores by Study Group*

	Study Group							
	1:1 (Individual; n = 9)		1:1 (Standard; n = 9)		1:3 (Standard; n = 11)[b]		PALS (n = 10)	
	Pretest	Posttest	Pretest	Posttest	Pretest	Posttest	Pretest	Posttest
Word ID[a]								
M	26.11	38.11	24.11	37.33	21.10	35.06	25.20	43.20
(SD)	(10.72)	(11.66)	(9.97)	(7.21)	(9.10)	(8.76)	(8.94)	(10.83)
Word Attack[a]								
M	5.33	10.89	5.75	10.78	4.32	9.32	7.20	16.10
(SD)	(5.17)	(6.68)	(5.01)	(4.38)	(3.62)	(6.00)	(4.85)	(9.22)
RLN[c]								
M	55.33	64.33	59.67	72.78	54.52	65.48	58.20	66.8
(SD)	(14.25)	(17.78)	(6.30)	(19.38)	(18.28)	(16.05)	(15.13)	(10.77)
Elision[d]								
M	4.44	5.44	3.63	7.67	6.13	7.29	4.20	7.3
(SD)	(2.92)	(3.21)	(2.45)	(1.00)	(2.72)	(2.27)	(3.19)	(3.95)
Spelling[e]								
M	12.33	15.56	12.88	16.78	12.42	15.39	13.80	17.50
(SD)	(3.64)	(4.33)	(2.36)	(2.28)	(2.16)	(3.72)	(2.82)	(4.58)

Table 12 (cont'd) . *Pre and Posttreatment Reading Raw Scores by Study Group*

	Study Group							
	1:1 (Individual; n = 9)		1:1 (Standard; n = 9)		1:3 (Standard; n = 11)[b]		PALS (n = 10)	
	Pretest	Posttest	Pretest	Posttest	Pretest	Posttest	Pretest	Posttest
CRAB 1 min[f]								
M	25.22	47.22	19.11	44.89	22.87	43.13	27.20	58.30
(SD)	(15.90)	(15.56)	(11.89)	(18.00)	(14.85)	(22.23)	(15.61)	(19.03)
CRAB 3 min								
M	64.44	128.44	51.00	132.78	59.32	119.58	73.10	160.90
(SD)	(40.97)	(43.58)	(32.00)	(57.39)	(42.75)	(66.38)	(36.76)	(69.67)
CRAB comp								
M	0.44	2.67	0.56	3.44	0.84	2.77	1.10	4.10
(SD)	(0.73)	(1.66)	(0.73)	(1.81)	(1.04)	(2.03)	(1.67)	(2.13)

[a] Word ID and Word Attack were given in December immediately before treatment. All other measures were given in August.

[b] For the 1:3 treatment group, the group was the unit of analysis [c] Rapid Letter Naming (Wolf, 1993); [d]CTOPP (Wagner et al., 1999) [e]WIAT (Wechsler, 1992); [f]Comprehensive Reading Assessment Battery (Fuchs, Fuchs, & Hamlett, 1989)

Table 13. *Average Improvement of Nonresponsive Students by Study Group* [a]

	Study Group							
	1:1 (Individual; n = 9)		1:1 (Standard; n = 9)		1:3 (Standard; n = 11)[b]		PALS (n = 10)	
	M	(SD)	M	(SD)	M	(SD)	M	(SD)
Word ID	9.22	(3.53)	8.00	(5.96)	8.32	(4.64)	11.20	(8.16)
Word Attack	3.00	(4.92)	-0.11	(2.67)	2.26	(3.62)	5.00	(5.64)
RLN[c]	9.00	(11.73)	13.11	(16.15)	10.04	(11.67)	13.89	(4.39)
Elision[d]	1.00	(1.73)	4.04	(2.88)	1.13	(1.36)	3.10	(3.41)
Spelling[e]	3.22	(3.67)	3.75	(2.87)	3.03	(2.16)	3.70	(4.19)
CBM	13.06	(6.17)	14.61	(10.84)	15.53	(12.29)	13.90	(9.05)
CRAB 1 min[f]	22.00	(13.23)	25.78	(17.40)	20.02	(9.69)	31.10	(15.88)
CRAB 3 min	64.00	(31.86)	81.78	(59.34)	60.48	(28.80)	87.80	(53.09)
CRAB comp	2.22	(1.56)	2.89	(1.90)	1.89	(1.06)	3.00	(2.00)

[a] Word ID, Word Attack, and CBM were given in December immediately before treatment. All other measures were given in August.

[b] For the 1:3 study group, the group of three students was the unit of analysis [c] Rapid Letter Naming (Wolf, 1993); [d]CTOPP (Wagner et al., 1999) [e]WIAT (Wechsler, 1992); [f]Comprehensive Reading Assessment Battery (Fuchs, Fuchs, & Hamlett, 1989)

groups. I will return to this finding later. Means and standard deviations for the six CBM points are presented in Table 14. The 1:1 individualized group gained approximately 13 words; 1:1 standard, 14 words; 1:3 standard, 15 words, and PALS, 14 words. The PALS group outperformed the other groups on the CRAB, which, like the CBM task, also measures reading fluency. On the CRAB 1 minute sample, the average gain across the school year was 22 words for 1:1 individualized; 25 words for 1:1 standard; 20 words for 1:3, and 31 words for the PALS group.

Effect Sizes

Effect sizes were computed for the study groups' performance on all reading measures using pretreatment to posttreatment gain scores. Mean gain scores were used to control for possible pretreatment differences. Although, as indicated in Chapter III, there were no pretreatment differences detected using statistical analysis, the lack of power in the study could have masked these effects. For example, on the CBM measure, the PALS group read 28.80 words correct per minute whereas the other groups read only 20 to 21 words correct per minute (see Table 14). Table 15 presents effect sizes for all reading measures including CBM. Effect sizes ranging from .20 to .49 are usually considered small; .50 to .79 medium; above .80, large (Cohen, 1992).

PALS versus tutored study groups

A central hypothesis of this study was that the nonresponders provided tutoring would outperform those who remained in classroom PALS. However, an examination of the effect sizes fails to support this hypothesis. Across all measures, except for spelling

Table 14. *Number of Words Correct Per Minute on CBM Measures*

	Study Group							
	1:1 (Individual; n = 9)		1:1 (Standard; n = 9)		1:3 (Standard; n = 11)		PALS (n = 10)	
	M	(SD)	M	(SD)	M	(SD)	M	(SD)
CBM 1	20.50	(10.00)	21.11	(12.46)	21.28	(13.68)	28.80	(14.29)
CBM 2	25.89	(9.04)	29.33	(11.08)	26.45	(17.92)	38.30	(19.96)
CBM 3	35.13	(12.73)	34.00	(15.69)	30.95	(19.70)	42.95	(16.25)
CBM 4	28.44	(10.59)	29.67	(13.68)	29.26	(20.86)	41.70	(20.38)
CBM 5	39.56	(17.69)	39.61	(19.01)	37.00	(26.70)	46.85	(22.24)
CBM 6	33.56	(14.10)	35.72	(19.43)	36.13	(23.44)	42.70	(19.54)

Table 15. *Effect Sizes - Second Grade Nonresponders*

Measures	Comparisons					
	1:1 Indiv. vs. PALS	1:1 Standard. vs. PALS	1:3 Standard. vs. PALS	1:1 Indiv. vs. 1:1 Standard.	1:1 Indiv. vs. 1:3 Standard.	1:1 Standard. vs. 1:3 Standard.
Word Identification	-0.44	-0.63	-0.62	0.35	0.30	-0.09
Word Attack	-0.53	-1.61	-0.83	1.11	0.25	-1.04
RLN	-0.80	-0.09	-0.61	-0.41	-0.13	0.31
Elision	-1.08	0.42	-1.09	-1.81	-0.12	1.90
Spelling	-0.17	0.02	-0.29	-0.23	0.09	0.41
CBM	-0.15	0.10	0.21	-0.25	-0.35	-0.11
CRAB 1 min	-0.88	-0.45	-1.21	-0.35	0.25	0.60
CRAB 3 min	-0.76	-0.15	-0.92	-0.53	0.16	0.67
CRAB comp	-0.61	-0.08	-1.00	-0.55	0.36	0.95

and CBM, children in the PALS group improved their scores in relation to children in the 1:1 individualized and 1:3 standard groups. In comparison to these tutored groups, PALS children scored .44 SD to 1.21 SD higher (see Table 15). The effect sizes were smaller for the PALS students when compared to the 1:1 standard group on Rapid Letter Naming (d = .09), CRAB 3 minute sample (d = .15) and CRAB comprehension (d = .08). The PALS group demonstrated moderate to high effect sizes when compared to the 1:1 standard group on Word Identification (d = .63), Word Attack (d = 1.61), Elision (d = .42), and the CRAB 1 minute sample (d = .45).

1:1 Individual versus 1:3 and 1:1 Standard

The effect size calculations revealed another interesting finding. While the PALS group had higher gain scores than the tutored groups on most measures, the 1:1 standard group had moderate to high effect sizes when compared to the 1:1 individual group on the following measures (see Table 15): rapid letter naming (d = .41), Elision (d = 1.81), CRAB 3 minute fluency (d = .53), and CRAB comprehension (d = .55). I had expected that students given a more individualized tutoring program would make more progress than those given a more standard approach. However, on most of the reading measures, the standard groups outperformed the 1:1 individual group. The 1:1 standard group also had moderate to high effect sizes when compared to the 1:3 standard group on the following measures: Elision (d = 1.90), Spelling (d = .41), CRAB 1 minute (d = .60), CRAB 3 minute fluency (d = .67), and CRAB Comprehension (d = .95). In contrast the 1:1 standard group was significantly lower than the 1:1 individual group (d = 1.11) and

the 1:3 group (d = 1.04) on Word Attack. The 1:1 standard group made no improvements on reading nonsense words as measured by the Word Attack subtest.

Post Hoc Analysis of Material Covered

Generally, these effect sizes were surprising and counterintuitive in the sense that those who remained in PALS seem to have better outcomes than those who were tutored. In addition, students in the individualized (non-standard) treatment group appeared to fare worst. One possible explanation for the pattern of findings is that students who remained in class-wide PALS may have covered more material than students in the tutored groups, and students in the individualized tutored group may have covered *less* material than those in the other tutored groups. I hypothesized that students who had covered more material would be able to read more words correctly on the WRMT-R single word and nonword reading measures. Therefore, I examined the breadth of coverage for each group and compared this coverage to the items on the WRMT-R Word Attack and Word Identification subtests.

In PALS tutoring, there are 25 different instructional sets that increase in difficulty. Each set includes sounds, review of old sounds, sight words, review of old sight words, decodable words and a story. (See Chapter III for a full description of the sets and the skills taught at each level.) For the 1:1 and 1:3 standard groups, the students reached set 24. In contrast, children in 1:1 individualized tutoring reached only set 18. This is because students included in individualized tutoring were moved to the next higher set only after they had mastered skills in that set. In contrast, students in the standardized groups (1:1 and 1:3) stayed in each set for only 1 week (i.e., 3 sessions)

regardless of their mastery level. This between-group difference in instructional pacing translates to the following: Children tutored in the standard groups were introduced to 10 more sounds and 13 more sight words than those in the 1:1 individualized group. More striking was the difference between the tutoring groups and the PALS group. Those children who remained in PALS were exposed to 14 more sounds, and 76 more sight words those in the standard tutoring groups. Those remaining in PALS were exposed to 34 more sounds and 89 more sight words than those in the 1:1 individualized tutoring group. Tables 16 and 17 present a comparison of sounds and sight words covered for each of the study groups.

To explore the possible importance of this difference between groups in content coverage, I compared test items on the Word Attack and Word Identification subtests of the WRMT-R to the content covered for each of the study groups. For Word identification, I determined whether each item on the test was taught as a sight word for each of the study groups. There were many words on the subtest that were also decobable (e.g., up and jump), so I also determined if the phonemes within the word had been taught for each of the four study groups. I found that there were only two words on the WRMT-R that were taught for the PALS group and not the other study groups (i.e., “boy” and “little”). For word attack, all words on the subtest were separated into phonemes and compared to the sounds taught in each study group. There were only 4 words that contained phonemes taught in the PALS condition when compared to the others. Therefore, content coverage does not seem to adequately explain the effect size differences between the study groups on the reading measures.

Table 16. *Comparison of Sound Coverage in each Study Group*

	Comparison			
	Covered in all 4 study groups	Classwide PALS not 1:1 individualized	Classwide PALS not standard	Classwide and Standard not 1:1 individualized
Sounds	a j a_e m k ai t e ay s y o_e f qu oa i z i_e d x igh r v u_e g u e_e h ck ar n sh ing o ch p c th ow l ee w b ea ou	er _o ir air _e ol are ur wh au oi kn aw oy ph ear oo wr eer al _le or ew _dge	ur ew wr oi ir _le oy ol _dge oo wh al kn	er au _eer _air aw _or _are _ear _e _o

Table 17. *Comparison of Sight Word Coverage in each Study Group*

Comparison																	
Covered in all 4 study groups			Classwide PALS not 1:1 individualized				Classwide PALS not standard				Classwide and Standard not 1:1 individualized		
I	his	would	me	others	enough	really	me	others	enough	really	again	friend	been
the	of	always	over	their	those	gone	over	their	those	gone	when	try	either
is	out	before	put	anyone	nobody	bought	put	anyone	nobody	bought	were	thought	little
on	there	already	my	couldn't	never	already	my	couldn't	never	already	away	trying	once
with	you	does	all	able	TRUE	although	all	able	TRUE	although	different		
a	her	who	from	leave	though	think	from	leave	though	think			
and	she	your	were	done	upon	toward	were	done	upon	toward			
was	go	are	says	nice	eight	again	says	nice	eight				
he	said	don't	what	even	grow	when	what	even	grow				
because	we	some	looking	everyone	shall	were	looking	everyone	shall				
are	when	everybody	every	above	easy	away	every	above	easy				
to	do	where	one	by	seven	different	one	by	seven				
they	could	here	be	another	change	friend	be	another	change				
has	into	over	only	great	show	try	only	great	show				
have	says	too	few	these	whole	thought	few	these	whole				
look	any	both	soon	by	body	trying	soon	by	body				
for	many	or	want	ever	pulled	been	want	ever	pulled				
some	about		no	full	drink	either	no	full	drink				
			very	which	giving	little	very	which	giving				
			onto	goes	myself	once	onto	goes	myself				
			our	almost	between		our	almost	between				
			two	as	foot		two	as	foot				
			should	why	against		should	why	against				

Growth Model of CBM

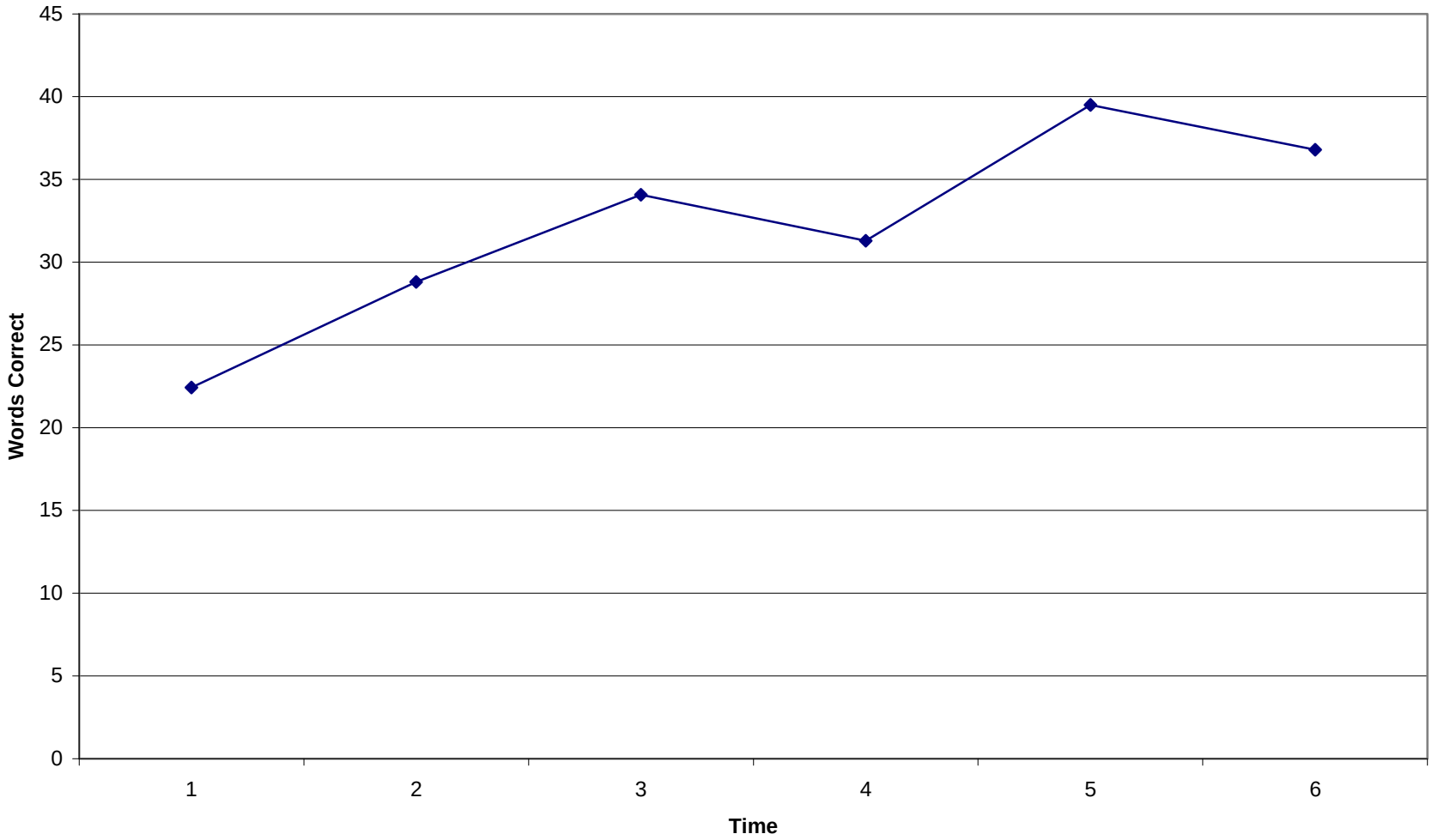
For the 6 CBM scores per student, individual growth curve analysis was conducted using hierarchical linear modeling (HLM; Bryk, Raudenbush, & Congdon, 1996). Only the performance of students in the three tutored groups were used in the analysis (i.e., students in the classwide PALS group were not included). Growth rates were modeled for each of the six CBM points per child. In addition, individual predictor variables were added to the model to determine the extent of variance each explained. The predictor variables were tutoring group, free lunch status, pre-treatment performance on Word Identification and Word Attack, ELL status, and WASI IQ scores.

Students in the 1:3 standard tutoring group were treated individually instead of as a group because HLM requires this. For some of the predictor variables, there were no feasible group mean. For example, it is impossible to assign a mean for free lunch status or ELL status because these variables are discontinuous by nature. Table 4 provides descriptive statistics for each of the CBM measurements (from January to April, 2002). Figure 1 provides a plot of the students' mean CBM performance scores.

A linear model was used to best fit the data for the six CBM measurement points for the following reasons: the duration between measurements was relatively brief (4 months) so linear modeling was reasoned to be appropriate (see Bryk & Raudenbush, 1992). In addition, visual examination of the data indicated that mean growth over time was linear (see Figure 1), despite a dip at the fourth measurement point.

The linear model for CBM was fitted on 49 students. Again, the 10 students who remained in the PALS classroom without tutoring were not added to the analysis. Because each CBM assessment was spaced 2 weeks apart, the six observations were

Figure 1. ***Mean Performance at Each CBM Assessment***



coded as -5, -4, -3, -2, -1, 0. When using this coding scheme, the intercept is the expected performance on the last observation (Time 6—April). The results of the unconditional linear growth model (no predictor variables entered into the equation) are presented in Table 18. The intercept for CBM represents the estimated mean of the last observation.

The estimated intercept was 38.02 words correct per minute. The actual mean for the students was 36.79 (see Table 14). The slope in the model represents average growth over the 6 measures. Therefore, the 49 students gained an average of 2.98 words every two weeks. The students' intercept values ranged from 8.52 to 110. The slopes ranged from -0.04 to 11.97.

Individual growth trajectories were plotted and are presented in Figure 2. Visual examination of these trajectories highlights the heterogeneity of the students' growth. Those who were pretested at a higher level generally made greater gains during the treatment period. Conversely, those with virtually no reading skills at the beginning of treatment made smaller gains.

The hypothesis testing of fixed effects yielded highly statistically significant t scores for the CBM measures. This indicates that both slope and intercept terms are necessary for modeling the students' growth. There was great variability in the students' scores on the CBM measures based on the significant chi-square statistic. There was especially large variance for the intercept. That is, there are important individual differences in slope and intercept, indicating that CBM can be modeled using HLM.

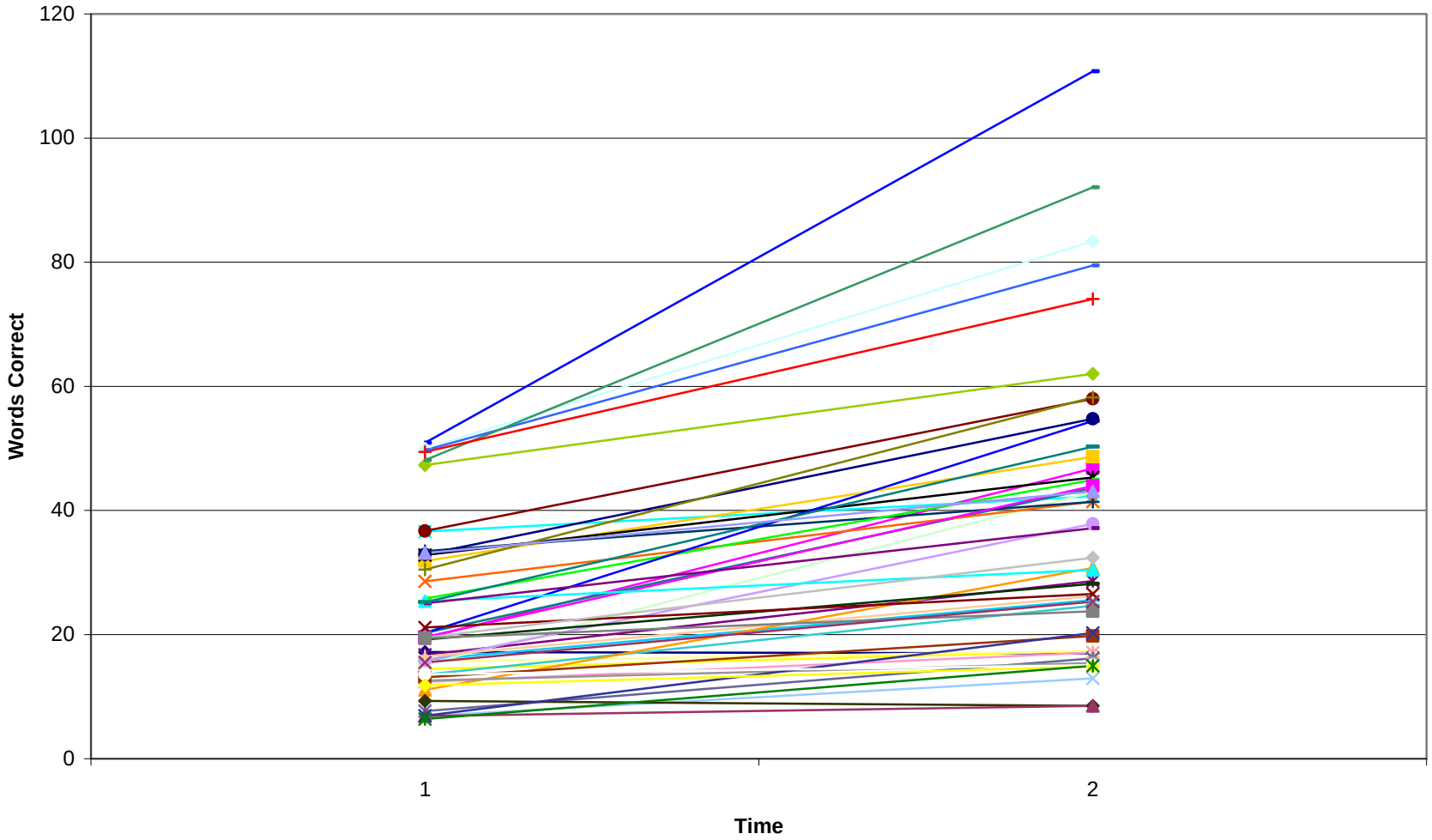
An additional analysis was conducted to determine whether there were differences between the tutoring groups, (1:1 standard, 1:1 individualized, 1:3 standard) slope and level terms. A one-way ANOVA was conducted. There were no statistically significant

Table 18. *Unconditonal Linear Growth Models for CBM*

	Fixed Effects			Random Effects		
	Coefficient	SE	t	Variance	X^2	Reliability
Intercept	38.02	1.91	19.87**	489.75	1167.91**	.959
Slope	2.98	0.63	4.71**	4.04	126.65**	.638

** p< .001

Figure 2. Individual CBM Growth Trajectories



differences between groups on level, F = .407, p = .749 or slope, F = .023, p = .995. These results indicate that individual differences are not due to study group membership.

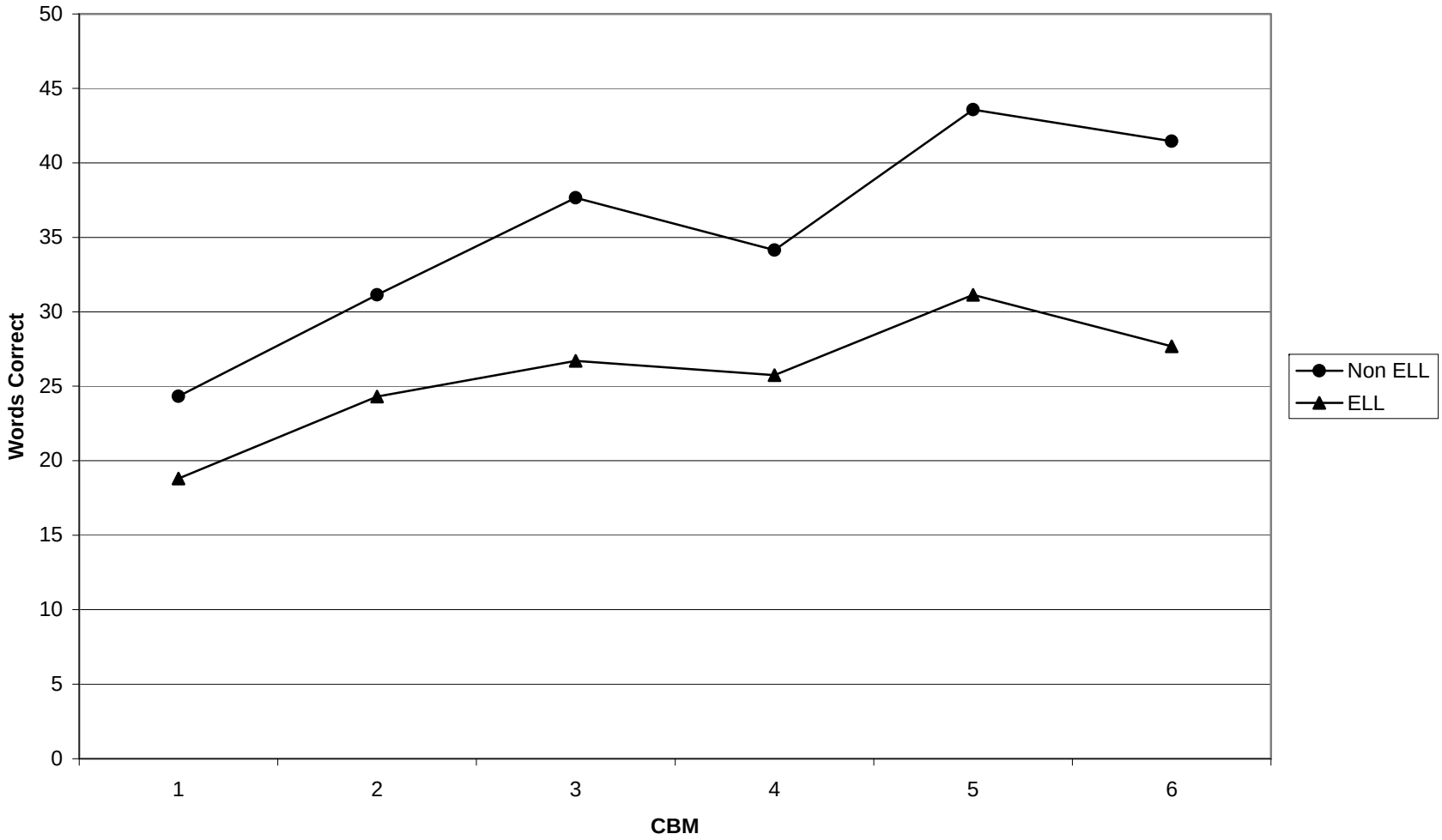
Conditional Models of Growth Using Predictor Variables

Several variables were entered into the model to determine their prediction of students' CBM growth over time. The variables included tutoring group, free lunch status, December Word Attack and Word Identification raw scores, ELL status, and WASI IQ scores. Table 19 shows the results of the fixed effects model. December Word Identification scores and ELL status were both statistically significant predictors of CBM intercept and slope. Tutoring group, free lunch status, December Word Attack, and IQ were not significant predictors. Results indicate that the level and slope were higher for students who were not English Language Learners. Figure 3 depicts the growth of ELL and non-ELL students. The figures clearly demonstrate the higher slope and level of native English speaking students. It is not surprising that December Word Identification was a statistically significant predictor due to the nature of the CBM probes. That is, passage fluency requires adequate word recognition.

Table 19. C*onditonal Linear Growth Models for CBM*

Variable		Coefficient	SE	t
Treatment Group				
	Intercept	2.79	3.30	0.85
	Slope	0.29	0.44	0.66
Free Lunch				
	Intercept	5.15	4.61	1.12
	Slope	0.95	.59	1.62
Initial Word ID				
	Intercept	1.65	.32	5.10**
	Slope	0.09	.03	2.73*
Initial Word Attack				
	Intercept	0.1	.58	.18
	Slope	0.09	.08	1.16
ELL				
	Intercept	13.41	4.58	2.93*
	Slope	1.68	.53	3.19*
WASI IQ				
	Intercept	0.18	.30	.62
	Slope	0	.03	0.005

Figure 3. Growth of ELL versus Non ELL students



CHAPTER V

DISCUSSION

In this chapter, I discuss the results of the study. As already indicated, students who were nonresponsive to generally effective reading instruction were randomly assigned to one of four study groups: (a) 1:1 individualized, (b) 1:1 standardized, (c) 1:3 standardized, and (d) classwide PALS. The groups were compared to each other to answer the following questions: (a) Is small group standard instruction a valid treatment for young readers who are nonresponsive to generally effective classroom instruction or is 1:1 standard instruction a better option? (b) Should the reading intervention be individualized for each student or is a research-based standardized treatment protocol (irrespective of whether it is conducted in groups of 1 or 3 students) sufficient? (c) Are there individual student characteristics that predict responsiveness to the reading intervention? I will discuss each of these questions in light of the results obtained. I will also discuss their practical implications, the limitations of this study design, and future research.

Study Group Differences

One purpose of this investigation was to determine whether there were differences in early reading performance between the four study groups: (a) 1:1 individualized, (b) 1:1 standardized, (c) 1:3 standardized, and (d) classwide PALS. Within this design, there were two important questions to answer. First, is 1:1 standard reading instruction better

than 1:3 standard reading instruction for low-achieving students in the second grade. Second, is it important to individualize this instruction? Put differently, do children in the 1:1 individualized instructional group outperform children in the two standardized reading groups and classwide PALS group?

Before continuing, it is important to note that a major challenge in conducting this kind of research--that is, the study of nonresponders--is that the researcher always ends up with a relatively small number of study participants, both in an absolute sense and relative to the initial number of participants. The nonresponders in this study came from a pool of 739 students in 40 classrooms. Of the 739 students, 214 were identified as at-risk and only 59 were eventually identified as nonresponders. So, despite that the larger study had many hundreds of students, very few were ultimately identified as nonresponders. Because the sample size was small, statistical power was necessarily reduced and effect sizes were calculated.

A basic assumption connected to both of the just-mentioned study purposes was that students in the three tutoring groups would make more progress than those who remained in the class-wide PALS instruction. Previous research (e.g., Torgesen et. al, 1999) documents the effectiveness of intensive, small-group reading interventions. I hypothesized that small group (1:3) standard instruction would be as effective as 1:1 standard instruction (National Reading Panel, 1998). However, I also predicted that children participating in the individualized 1:1 group would make the most progress of all instructional groups because instruction in this group was tailored to meet the needs of each individual child. Remember that children in this group were permitted to advance to the next tutoring set only when they had reached 90% mastery on all tasks. In addition,

tutors of children in this group met weekly with other project staff to discuss each student's progress, and to brainstorm ways to modify materials and strategies. The instruction in this study group was meant to represent good individualized instruction in special education.

Effect size calculations did not support my predictions. Overall, students who remained in the classroom (classwide PALS group) seemed to make the most progress of the study groups on many of the reading measures. In addition, those who received individualized instruction seemed to make the *least* amount of progress. These results motivated me to conduct post hoc analyses to determine possible differences among the four study groups that may have led to our unexpected findings.

Breadth of Material Covered

One consideration was breadth of material covered during instruction. As discussed in Chapter 4, there were striking differences between students who remained in the classroom (classwide PALS) and those who were pulled out for tutoring with regards to the amount of new material covered. Students in the 1:1 standardized and 1:3 standardized tutoring condition were introduced to 10 more sounds and 13 more sight words than those in the 1:1 individualized tutoring. Children in classwide PALS were exposed to 34 more sounds and 89 more sight words than those in individualized tutoring. In addition, classwide PALS students were asked to learn 14 more sounds and 76 more sight words than those in the standardized (1:1 and 1:3) tutoring conditions. It is also noteworthy that both tutoring PALS and classwide PALS include a great deal of repetition and review. Therefore, those in the standardized and classwide PALS

instructional groups were exposed to old sounds and sight words throughout the scope and sequence of the tutoring. If a sound or sight word was not mastered, there was opportunity within the review to master the words and sounds. It occurred to us that teaching to mastery in the individualized condition was unnecessary, and perhaps even detrimental, to students' progress. However, an examination of the words on two subtests of the WRMT-R (Word Identification and Word Attack) did not seem to support this hypothesis. That is, there were only 2 words on Word Identification covered by the PALS group and not the tutoring groups; only 4 words on the Word Attack subtest that contained phonemes learned only by the PALS group. This between-groups difference does not adequately explain the differential performance of the four study groups.

Individual Student Characteristics

A plot of individual growth curves demonstrated dramatic variability in students' response to instruction based on the CBM measures. The mean number of words gained across the 49 students in the three treatment groups (not the control PALS condition) was 2.98 words every two weeks. Rate of growth (slope) ranged from a low of -.04 to 11.97 with an average number of words read as 36.79. Again, the intercept values were highly variable ranging from 8.52 words read correctly per minute to 110 words. Whereas the expected number of words read correctly per minute at the end of 2nd grade is approximately 70, tutored students read an average of only 37 words at the end of tutoring. (At the beginning of tutoring, their average was 22 words.) Although the tutoring did not significantly help the students approach the goal of 70 words read correctly per minute, an average of 3 words per every other week gain is considered

acceptable. Visual inspection of the individual growth curves indicated that those who started out with higher scores made the most progress. Those with little or no reading skills at the start of instruction made the least amount of gains. Others (e.g., Al Otaiba & Fuchs, 2006; Torgesen, 2004; Torgesen et al., 1999) have found this same pattern of differential growth.

Several variables were entered into a growth curve analysis to determine what, if any, individual student characteristics predicted growth on the CBM measures. The variables included study group, free lunch status, initial scores on Word Identification and Word Attack, ELL status, and WASI IQ scores. Significant predictors were ELL status and pretest Word Identification scores. Those who were not ELL had a higher level and slope that those who were. Those with higher pretest Word Identification scores also had higher performance levels and slope on the CBM probes.

Results from this growth curve analysis did highlight the heterogeneity of the sample, described in detail in Chapter IV. Specifically, the intercept values on the CBM measures ranged from 8.52 words read correctly per mintute to 110.0. Practically, this means that at the end of tutoring, some students were reading an average of 8 words correctly per minute while others were reading 110 words. In addition, the students' growth rate, or slope, ranged from -.04 to 11.97 words gained every two weeks. This has potentially important implications in the classroom. Teachers are expected to teach large numbers of students with very different performance levels and growth rates. Even in our clearly defined sample of lowest- performing students (59 lowest achievers from more than 700 students), there was still a large range in performance. Teachers need to be able to group students with similar needs. In addition, the grouping would need to be flexible

based on ongoing assessment. For example, three children who are performing similarly at the beginning of tutoring, may progress at very different rates. Therefore, ongoing assessment should be used to "regroup" students as the tutoring progresses. This will require ongoing vigilance from teachers.

Study Limitations

Whereas there were several strengths associated with this study design (random assignment of students to study groups, well-trained and experienced tutors, research-based treatments, documentation of treatment fidelity, and identification of nonresponsive students using a dual discrepancy approach) there were also limitations. First, as mentioned, sample size was relatively small to support exploration of the importance of three tutoring groups and a control condition. However, in defense of the study design, the 59 nonresponsive students identified during the course of the study were drawn from a sample of more than 700 students and 200 at-risk students.

Second, the failure to find differences between the study groups may have been due to other factors, including that the content of the tutoring lessons was based on the classroom PALS lessons (i.e., decoding words, practicing sounds, reading controlled text). Although the pace of tutoring was slowed down and more repetition was added, one could question why nonresponders were continued in a treatment program that had not been successful for them. Third, this study did not include a no-treatment control. Students were compared to a successful, research-based reading curriculum. It would have been useful to compare the tutoring groups to more conventional general classroom instruction. Past research has used no treatment control conditions to compare groups and

the results were different than what we found: Tutored groups performed better than those who stayed in the classroom (e.g., Elbaum, et al, 1999; Swanson, 1999).

Conclusions and Implications for Future Research

The topic of reading failure was given great importance and visibility in national policy making with the signing of the No Child Left Behind legislation in 2002. Since then, much research has focused on remediating reading difficulties among students who are unresponsive to generally effective interventions. In this study, we found the most impaired readers across 40 second grade classrooms and implemented relatively intensive research-based reading interventions.

One focus was to determine whether small group instruction is as effective as individual instruction. Research has documented that small group instruction is just as effective as 1:1 instruction for many students (Baker, et al., 1990; Polloway, et al., 1986; Swanson, 1999; Torgesen, 2004). In addition, group sizes of up to 6 students have been shown to be as effective as individual instruction (Anonymous, 2001; Thurlow, 1993). We sought to determine if this finding remained true for the most impaired readers. Across reading measures, students in 1:3 standard tutoring fared as well as those in 1:1 individualized tutoring. However, those who participated in 1:1 standardized tutoring had medium effect sizes on fluency measures ($\underline{d}$ = .60 for 1 the minute fluency measure and $\underline{d}$ = .67 for the 3 minute fluency measures) when compared to students in the 1:3 standard tutoring. In addition, those in 1:1 standard tutoring performed almost 1 SD higher on comprehension ($\underline{d}$ = .95) and almost 2 SDs higher on elision ($\underline{d}$ = 1.90) than students in the 1:3 standard tutoring. Conversely, students who were not tutored and who remained

in the classroom performed better than students in 1:3 standard tutoring on all measures except for spelling. However, we interpreted these finding with caution because children remaining in the classroom also performed better than those in the 1:1 standard tutoring condition. Thus, our conclusions are limited to the comparison between 1:1 standard tutoring and 1:3 standard tutoring conditions. Overall, our findings seem to support previous research that shows that small-group instruction is as effective as 1:1 instruction. If our findings and others' findings are valid, they have important practical implications: More students may be served with less resources. An important consideration is how to increase the reading comprehension in the 1:3 tutoring groups. Remember that reading comprehension was not addressed in any of our tutoring variants, so direct instruction in comprehension might benefit all students and decrease dependence on incidental learning. Elbaum et al. (2000) found that reading comprehension instruction was the most effective reading intervention. Future research might focus on this possibility.

A second question was whether tailoring instruction to the needs of each individual student is necessary. Children in the individualized 1:1 tutoring group were the *least* likely to respond to the tutoring. This finding surprised us. It seems to strengthen the argument for a standard treatment protocol approach that requires less resources in terms of teacher training and time. A standard-treatment-protocol approach should be research based and rely less on teacher judgement of what might work for a particular child. Our analysis also indicates that students in individualized 1:1 tutoring received less coverage of concepts and skills. Future research should specifically address the balance between teaching to mastery and content coverage.

Finally, the study examined whether individual student characteristics predict response to treatment. Only two characteristics were found predictive: reading skill before tutoring began and ELL status. Those with higher reading skills before tutoring made the most progress during tutoring. This is consistent with the available literature on treatment outcomes (e.g., Al Otaiba & Fuchs, 2006; Torgesen, 2004; Torgesen et al., 1999). In addition, ELL children made the least amount of progress. Future research should explore how to best serve their needs.

Again, study results must be interpreted with caution. It is important to remember that the "control group" in this study was receiving research-based instruction that has been shown to be effective for young students at all achievement levels (i.e., classwide PALS). A possible research question is how tutored students would fare compared to students in a typical classroom or a typical special education classroom. A more comprehensive approach to reading instruction that includes decoding, phonological awareness, spelling, fluency, vocabulary and comprehension should also be considered as part of the tutoring of struggling young readers.

Future Analyses

Given this study's unexpected results and its limited power due to small sample sizes, there are additional analyses one might conduct that are beyond the scope of this paper. I would like to discuss several of these below.

One approach that would increase power would be to reconceptualize comparisons between and among the study groups. Instead of calculating effect sizes for every comparison possible, one could combine two or more groups to increase the sample

size and statistical power. For example, the group of students who remained in PALS could be compared to all tutored study groups. Another comparison might combine both 1:1 groups (i.e., standard and individualized) and compare the combination to the 1:3 group.

In a different vein, one might conduct repeated measures analysis of pre- and post treatment data to determine what if any student growth occurred (i.e., student growth on reading measures) using time as the dependent variable instead of tutoring group. This analysis would determine whether tutoring was effective in increasing reading skills rather than looking at differences between the study groups. In addition, a so-called dual discrepancy criterion using slope and level on CBM passages (e.g., 70 words correct per minute; number of words gained per week) could be used to determine what students in which tutoring groups reached that level of success.

Finally, nonparametric analyses would be appropriate for these data. Using CBM, one might use something like an AB design in single subject research; specifically, use the data from September to December as a baseline for all study groups because all students were in classwide PALS at that point. Then, at the start of the tutoring (January), determine the progress in tutoring by examining the change in slope for each study group. This would arguably control for pretreatment differences before tutoring that were not detectable due to the lack of statistical power.

APPENDIX

SCOPE AND SEQUENCE OF TUTORING

Unit 1 Scope and Sequence

Set	New Sounds	Old Sounds	Decodable words	New Sight words	Old Sight words	Story
1	a, m, t, s, f		am, Sam. sat, mat, fat, fast	I, the, is, on		"Sam"
2	i, d, r	a, m, t, s, f	it, fit, mitt, sit, rat, mat, Tim, Dad	with, a, and	I, the, is, on	"Sam and Tim"
3	g, h, n	a, m, t, s, f, i, d, r	Rags, tags, him, hit, had, hat, gift, grin	was, he	I, the, is, on, with, a, and	"The Gift"
4	o, c, l, b	a, m, t, s, f, i, d, r, g, h, n	Tab, cat, big hot, not, log, lost, glad	because, are, to	I, the, is, on, with, a, and, was, he	"Tab is Lost!"
5	w, p	t, s, f, i, d, r, g, h, n, o, c, l, b	wags, wins, pals, hop, stop, flop, hot, dog	they, has	I, the, is, on, with, a, and, was, he, because, are, to	"Tab and Rags Play"
6	j, k, e	i, d, r, g, h, n, o, c, l, b, w, p	Kim, Jim, jog, frog, wet, get, best, rest	have, look, for	is, on, with, a, and, was, he, because, are, to, they, has	"At the Park"
7	y, qu, z	g, h, n, o, c, l, b, w, p, j, k, e	yes, yet, quiz, quit, yells, tells, snap, trap	his, of, out	a, and, was, he, because, are, to, they, has, have, look, for	"The Trap"
8	x, v, u	o, c, l, b, w, p, j, k, e, y, qu, z	van, vest, box, fox, fix jump, lump, yells	there, you, her	he, because, are, to, they, has, have, look, for, his, of, out	"Ann and Jack Play Tag"

Unit 2 Scope and Sequence

Set	New Sounds	Old Sounds	Decodable words	New Sight words	Old Sight words	Text
9	ck, sh	l, b, w, p, j, k, e, y, qu, z, x, v, u	Jack, snack, back, pack, track, fish, wish, fresh	she, go, said, we	they, has, have, look, for, his, of, out, there, you, her	“The Trip”
10	ch, th	w, p, j, k, e, y, qu, z, x, v, u, ck, sh	that, then, thick, math, checks, wish, blocks, quiz	when, do	have, look, for, his, of, out, there, you, her, she, go, said, we	“Mom Helps Jack”
11	ee, ea	j, k, e, y, qu, z, x, v, u, ck, sh, ch, th	Beans, peas, clean, three, eat, meal, seat, treat	could, into, says	his, of, out, there, you, her, she, go, said, we, when, do	“Ann and Kathleen help Aunt Sue”
12	ou, ow	e, y, qu, z, x, v, u, ck, sh, ch, th, ee, ea	found, pound, town, brown, hound, leash, need, keep	any, many, would	there, you, her, she, go, said, we, when, do, could, into, says	“Rags Gets Loose”
13	a_e, ai, ay	z, x, v, u, ck, sh, ch, th, ee, ea, ou, ow	way, stay, fail, wait, plane, wakes, day, James	always, before	her, she, go, said, we, when, do, could, into, says, any, many, would	“James has a Dream”
14	o_e, oa	v, u, ck, sh, ch, th, ee, ea, ou, ow, a_e, ai, ay	Joke, groan, coax, hoax, moan, oat, toast, hope	already, does	go, said, we, when, do, could, into, says, any, many, would, always, before	“Joan Cuts the Grass”
15	i_e, igh	ck, sh, ch, th, ee, ea, ou, ow, a_e, ai, ay, o_e, oa	might, sight, flight, time, like, fine, slide, line	who, your, are	when, do, could, into, says, any, many, would, always, before, already, does	“Job Day”
16	u_e, e_e	ch, th, ee, ea, ou, ow, a_e, ai, ay, o_e, oa, i_e, igh	Use, cute, mule, Steve, Pete, lines, fine, smile	don’t, some, everybody	into, says, any, many, would, always, before, already, does, who, your, are	“The New Play”

Unit 3 Scope and Sequence

Set	New Sounds	Old Sounds	Decodable words	New Sight words	Old Sight words	Story
17	ar	th, ee, ea, ou, ow, a_e, ai, ay, o_e, oa, i_e, igh, u_e, e_e	Carl, sharp, shark, smart, snarls, darts, fine, beach	where, here, over, too	many, would, always, before, already, does, who, your, are, don't, some, everybody	A Big Tuna
18	ing	ee, ea, ou, ow, a_e, ai, ay, o_e, oa, i_e, igh, u_e, e_e, ar	treating, dressing, grunting, howling	both, or, some, about	already, does, who, your, are, don't, some, everybody, where, here, over, too	The Mean Beast
19	er	ea, ou, ow, a_e, ai, ay, o_e, oa, i_e, igh, u_e, e_e, ar, ing	clatter, supper better, after, grinning, chilling, started, waited	again, when, were	are, don't, some, everybody, where, here, over, too, both, or, some, about	The Train Crash
20	-air, -are	ow, a_e, ai, ay, o_e, oa, i_e, igh, u_e, e_e, ar, ing, er	scared, fair share, care, letter, farmer, drummer, summer	away different friend	everybody, where, here, over, too, both, or, some, about, again, when, were	Sam's Penpal
21	au, aw	ai, ay, o_e, oa, i_e, igh, u_e, e_e, ar, ing, er, _air, _are	saw, crawled, launched, awful, pitcher, upset, bases, playing	try	where, here, over, too, both, or, some, about, again, when, were, away different friend	The Home Run
22	-ear, -eer	o_e, oa, i_e, igh, u_e, e_e, ar, ing, er, _air, _are, au, aw	hear, feared, cheer, near, fault, August, hardest, biggest	thought, trying	over, too, both, or, some, about, again, when, were, away different friend, try	Mike's Prize
23	-or	oa, i_e, igh, u_e, e_e, ar, ing, er, _air, _are, au, aw, _ear, _eer	for, or, cheer, shower, morning, bother, shelter, freezing	been, either	both, or, some, about, again, when, were, away different friend, try, thought, trying	My New Pal
24	-o, -e	igh,u_e,e_e,ar ing,er,_air, _are,au,aw, _ear,_eer,_or	so, go, robot, token, Noel, she, he, began	little, once	some, about, again, when, were, away different friend, try, thought, trying, been, either	Noel the Snob
25	ur	_o, *e,* u_e, e_e, ar, ing, er, _air, _are, au, aw, _ear, _eer, _or	Devin, purple, hurt, exploded, fur, monster, growled, peeking	another	little, once, again, were, away, different, friend, try, trying, thought, been, either, when, about	The Nightmare

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