MADISON METROPOLITAN SCHOOL DISTRICT

545 West Dayton St. ● Madison, Wisconsin 53703-1995 ■ 608.663-1607 ▼ www.mmsd.org

Daniel A. Nerad, *Superintendent of Schools*

December 2, 2009

To: Members of the Board of Education

From: Sue Abplanalp, Assistant Superintendent for Elementary Education
Lisa Wachtel, Executive Director, Teaching & Learning
Mary Jo Ziegler, Language Arts/Reading Coordinator, Teaching & Learning
Jennie Allen, Title I
Ellie Schneider, Reading Recovery Teacher Leader

Re: Reading Recovery Research, Data Analysis, and Recommendations

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Background
The Board of Education requested a thorough and neutral review of the Madison Metropolitan School District's (MMSD) Reading Recovery program. In response to the Board request, this packet contains a review of Reading Recovery and related research, Madison Metropolitan School District (MMSD) Reading Recovery student data analysis, and a matrix summarizing three options for improving early literacy intervention. Below please find a summary of the comprehensive research contained in the Board of Education packet. It is our intent to provide the Board of Education with the research and data analysis in order to facilitate discussion and action toward improved effectiveness of early literacy instruction in MMSD.

Reading Recovery Program Description
The Reading Recovery Program is an intensive literacy intervention program based on the work of Dr. Marie Clay in New Zealand in the 1970's. Reading Recovery is a short-term, intensive literacy intervention for the lowest performing first grade students. Reading Recovery serves two purposes. First, it accelerates the literacy learning of our most at-risk first graders, thus narrowing the achievement gap. Second, it identifies children who may need a long-term intervention, offering systematic observation and analysis to support recommendations for further action.

The Reading Recovery program consists of an approximately 20-week intervention period of one-to-one support from a highly trained Reading Recovery teacher. This Reading Recovery instruction is in addition to classroom literacy instruction delivered by the classroom teacher during the 90-minute literacy block. The program goal is to provide the lowest performing first grade students with effective reading and writing strategies allowing the child to perform within the average range of a typical first grade classroom after a successful intervention period. A successful intervention period allows the child to be "discontinued" from the Reading Recovery program and to function proficiently in regular classroom literacy instruction.

Reading Recovery Program Improvement Efforts
The national Reading Recovery data reports the discontinued rate for first grade students at 60%. In 2008-09, the discontinued rate for MMSD students was 42% of the students who received Reading Recovery. The Madison Metropolitan School District has conducted extensive reviews of Reading Recovery every three to four years. In an effort to increase the discontinued rate of Reading Recovery students, MMSD worked to improve the program's success through three phases.

Phase I
The first phase of improvement focused on intensifying program integrity. During 2008-09, *A Reading Recovery Guide for Principals* was developed. The guide was presented and disseminated to all elementary principals. *A Reading Recovery Guide for Principals* clarifies the aspects of Reading Recovery that are integral to program success, including: leadership roles; program fundamentals; central hiring processes; selection of students; operational and space requirements; instructional design; assessment and analysis; professional development; collaboration between Reading Recovery teachers and staff; and monitoring and evaluation.

Phase II
The second phase of improvement focused on the qualitative evaluation of the program. The research review contained in this packet addresses the context of Reading Recovery in light of our MMSD demographics, implementation and overall K-5 comprehensive literacy model.

Phase III
The third phase was a quantitative evaluation of the Reading Recovery program. The data analysis and findings in this packet provide quantitative perspectives describing: program effectiveness over time; program effectiveness by school site; statistical information to support improved student selection and program implementation during the year; as well as long-term impacts for student achievement.

Options
Three options presented for Board consideration and action are:

1. Leave Reading Recovery as it is and work toward improvement for increased student outcomes.
    - Continue to investigate possible models for literacy intervention prior to and beyond first grade.

2. Redistribute Reading Recovery positions in schools with the highest socio-economic and educational needs.
    - Allows for full implementation of Reading Recovery and the creation of a support system for intervention at our highest need schools as indicated in the recommendation section of the report.
    - Adopt all recommendations in the report.

3. Utilize the Reading Recovery positions and program funds in an expanded model serving more students in the development of a Comprehensive Literacy Model.
    - Maximizes Reading Recovery expertise district-wide through an early literacy interventionist model.
    - Creates a continuum of literacy to support students Pre-K through 5th grade.
    - Promotes inclusive practices and systematic literacy learning through ongoing professional development of teachers using interventionist's collaboration and support.

Recommendations
The MMSD Administration recommends Option 2 be implemented in 2010-11 with an annual review process and a comprehensive re-evaluation due to the Board of Education within two years. Option 3 may be recommended in the future, pending the outcome of the Option 2 review process.

Attachments
Reading Recovery and Comprehensive Literacy Next Steps: Option Matrix
Reading Recovery: A Synthesis of Research, Data Analysis and Recommendations

Reading Recovery and Comprehensive Literacy Next Steps

OPTIONS	Model Description	Strengths	Challenges	Recommendation
1. Reading Recovery: Current Model	▪ 23 schools receive allocation for Reading Recovery ▪ Some of the lowest English-speaking first graders at each site receive service ▪ Teacher Leaders offer coaching , ongoing, P.D. support and support from UW ▪ Data reported to National organization ▪ Administrators support fidelity ▪ Continue investigation of MMSD Comprehensive Literacy Model	▪ Large number of schools receive Reading Recovery services (23) ▪ Students across many schools gain skills ▪ Some of the lowest English-speaking first graders at each site receive service ▪ Teacher Leaders offer coaching , ongoing, P.D. support and support from UW ▪ MMSD receives a report from the National organization ▪ Administrators support fidelity;	▪ Costs for National organization and ongoing out-of-district commitments ($6,300) ▪ Need to train new teacher leader for Reading Recovery in Spanish ▪ Bound by National standards and guidelines ▪ Outcomes lower than national average ▪ Inconsistent discontinuation rate across schools ▪ Low fidelity to National Reading Recovery Model – not fully implemented ▪ Less site-based collaboration ▪ Cost per child ▪ Hiring and maintaining qualified Reading Recovery teachers ▪ Communication with classroom teachers	**NO**
2. Redistribute Reading Recovery teachers: Full Implementation Model	▪ Full implementation to provide Reading Recover to the lowest 20% of first grade students ▪ Implement the MMSD Comprehensive Literacy Model	▪ Increases fidelity to National Reading Recovery Model – 100% implementation ▪ Creates an intensive intervention system of support ▪ Maintains relationships with U.W. and surrounding communities ▪ Continues support of Reading Recovery Teacher Leaders for district intervention initiatives ▪ More cost effective than option 1 ▪ Increases discontinuation rates ▪ Increases collaboration with classroom teachers ▪ Increases the knowledge base in literacy across the school. ▪ Cost effective use of Reading Recovery trained personnel ▪ Job-embedded professional development	▪ Costs for National organization and ongoing out-of-district commitments ($6,300) ▪ Need to train new teacher leader for Reading Recovery in Spanish ▪ Bound by National standards and guidelines ▪ Cost per child ▪ Hiring and maintaining qualified Reading Recovery teachers ▪ Some schools will lose Reading Recovery ▪ Immediate support for Non-Reading Recovery schools	**YES**
3. Reallocate Reading Recovery teachers and program funds	▪ Elementary schools will receive allocation for an early literacy interventionist ▪ Implement the MMSD Comprehensive Literacy Model	▪ Inclusive and flexible intervention support system across grades K-5 ▪ Effective use of resources – small group instruction serves more students ▪ Creates an intensive intervention system of support	▪ Reorganizing building-level literacy plan to meet district guidelines for MMSD Comprehensive Literacy Model ▪ Providing more professional development related to best practices in literacy K-5, across languages ▪ Reading Recovery teachers lose National	**YES at a future date pending the outcome of the option two review process.**

OPTIONS	Model Description	Strengths	Challenges	Recommendation
		▪ Increases collaboration and modeling with classroom teachers ▪ Increases the knowledge base in literacy across the school ▪ Job-embedded professional development ▪ Time will be spent in classrooms modeling and supporting intervention implementation K through fifth grade in order to use resources effectively ▪ Opportunity to embed culturally relevant literacy practices during intervention ▪ Cost effective use of Reading Recovery trained personnel	Organization connections and licensure ▪ Loss of Reading Recovery relationship with U.W. and surrounding communities ▪ Since there is a loss of National ongoing training for Reading Recovery Teacher Leaders, the district will need to adopt a researched based system to support the interventionist ▪ Determine, adopt and plan for implementation of the new interventionist as it interfaces with the MMSD Comprehensive Literacy Model	

Appendix LLL-6-8
December 14, 2009

Reading Recovery®

A Synthesis of Research, Data Analysis and Recommendations

Madison Metropolitan School District

Report to the Board of Education

December, 2009

Reading Recovery® Report

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LITERATURE REVIEW
PART I

What is Reading Recovery®?

Reading Recovery® is an intensive literacy intervention based on the work of Dr. Marie Clay. Clay's observations of emergent reading behavior in New Zealand established the clinical basis of Reading Recovery®. During its development in the 1970s, Reading Recovery® was considered a ground-breaking preventive intervention (Clay, 1984) and it was seen as an alternative model to the remedial or diagnostic-prescriptive models of support for students with literacy difficulties. Clay described the program as a "safety net" for students (Clay, 1997) or a "second wave" of teaching. The Reading Recovery® program laid the groundwork for the current day response to intervention model (RtI).

As described in the Madison Metropolitan School District (MMSD) Site Report (2009), Reading Recovery® is a short-term literacy intervention for the lowest performing first grade students. Reading Recovery® students receive 30 minutes of intensive literacy instruction daily in a one-to-one setting with a specially-trained teacher for up to 20 weeks. The goal is for students to develop effective reading and writing strategies that are within the average range of a typical first grade classroom.

When Reading Recovery® was implemented in the United States, Pinnell et al. (1994) conducted a randomized trial to establish its effectiveness. Assessment tools developed by Marie Clay continue to be the anchor assessments used to measure Reading Recovery® effectiveness. The *Observation Survey of Early Literacy Achievement* (1993, 2002) measures six components of emergent literacy and was designed to support valid and reliable data gathering. The components of this survey guided the development of the *Primary Language Arts Assessment* (PLAA) used across MMSD elementary schools to gather formative reading data.

The National Reading Recovery® Council continues to use a two-group, quasi-experimental pre-post comparison design to confirm reliability and fidelity of the intervention at the national level using the *Observation Survey* as a data gathering tool. The national council also collects effectiveness studies and publishes them at the following link: http://readingrecovery.org/research/effectiveness/index.asp .

What are the potential benefits of implementing a Reading Recovery® program?

There are two positive outcomes for students who participate in Reading Recovery®:

1. Since 1984 when Reading Recovery® began in the United States, approximately 75% of students who complete the full 12- to 20-week intervention can meet grade-level expectations in reading and writing. Reading Recovery®'s one-to-one instruction delivers measurable results in weeks not years. Follow-up studies indicate that most Reading Recovery® students also do well on standardized tests and maintain their gains in later years.

2. The few students who are still having difficulty after a complete intervention are recommended for further evaluation. Recommendations may be made for future

support (e.g., classroom support, Title I, LD referral). This represents a positive, supportive action on behalf of the child and the school. Diagnostic information from Reading Recovery® is available to inform future decisions.

What design features support Reading Recovery®?

The three levels of intense support embedded in the design of the Reading Recovery® program strengthen its effectiveness: 1) university professors provide on-going professional development and support for teacher leaders; 2) district- or site-level teacher leaders offer extensive professional development and support for school-based teachers; 3) highly-trained, school-based teachers then work with high-need first graders providing intensified and specialized literacy intervention.

As students progress through the intervention program they are continually assessed and a determination is made as to next steps for instruction. The Reading Recovery® teacher selects one of the following next steps for each student:

1. **Discontinued** – student is meeting grade level expectations in reading and writing. Nationally, Reading Recovery® Council of North America reports that 75% of students who are either discontinued or have had a full intervention (defined as 12-20 weeks) meet this goal. However, the rate of discontinued students drops to 60% as a percentage of all students served in the program, including students who moved or who had an incomplete program.

2. **Recommended** – defined as students who are still having difficulty after a complete intervention and require additional evaluation and/or support.

3. **Incomplete** – Although Reading Recovery® includes these students when it reports data on all children served, it does not count these students when calculating discontinuation rates of students who have received a full program. In Madison, a significant percentage of Reading Recovery® students exit the program as incomplete. This generally means they did not receive a full program of up to 20 weeks because the school year ended before they completed a full series of lessons.

4. **Other** – Outcome does not fit any of the above categories or student who moved.

What is the scientific evidence around Reading Recovery®?

The U.S. Department of Education's Institute of Education Sciences established the What Works Clearinghouse (WWC) in order to "assess the rigor of research evidence on the effectiveness of interventions (programs, products, practices, and policies), giving educators the tools to make informed decisions." The WWC provides independent reviews of education programs and approaches, based on scientific evidence from randomized controlled or quasi-experimental studies. Reading Recovery® is one of the few literacy programs that has research studies that meet the WWC's rigorous criteria.

WWC's review of the research on Reading Recovery® found overall positive findings when evaluating the effectiveness of the program. More specifically, the report indicates Reading Recovery® has positive effects on alphabetics (defined as being made up of phonemic awareness, print awareness, letter knowledge and phonics), and general reading achievement, and potentially positive effects on fluency (flow and expressiveness), and

comprehension (vocabulary and meaning-making). This is an excellent rating in comparison with the ratings given to other beginning reading programs (Reynolds, 2009).

Critics (Englemann, 2008; Slavin, 2008; Stockard, 2008) express concerns about the WWC evaluation of programs regarding selection of studies, reporting of outcomes, matches between constructs and measures, as well as the magnitude of effect size. Of the five studies that met the WWC criteria, four were more than 10 years old and three (Pinnell et al., 1988, 1994; Schwartz, 2005) were carried out by Reading Recovery® affiliates (Reynolds, 2009). Critics note the WWC findings use sections of each study to draw conclusions, not the full report. Because of this, the WWC results are not similar to the findings of the studies they reference. Since the full studies investigated a range of research questions beyond whether Reading Recovery® is effective, the overall conclusions of the studies are not the same as the WWC findings. As examples:

- ✓ Baenen et al. (1997) found that "Reading Recovery® students scored significantly higher on the Clay Diagnostic Survey than a control group. However, success rates declined in later years, and long-term results were not as positive."

- ✓ Iverson and Tunmer (1993) concluded that Reading Recovery® could be more effective if it included a more systematic teaching of phonics. (Reading Recovery® lessons were adjusted to include more explicit phonics work after this study.)

- ✓ Pinnell et al. (1988) investigated whether students taught by Reading Recovery® teachers in regular lesson time had better results than students taught by different teachers in regular lesson time. They found that students had a slight advantage when taught by Reading Recovery® teachers in regular lessons, but results were not statistically significant.

- ✓ Pinnell et al. (1994) compared the achievement of four groups (traditional Reading Recovery®, Reading Recovery®-like individual intervention, Reading Recovery® -like group intervention, and basic skills). It found that Reading Recovery® students had superior achievement on general reading achievement measures compared to students in alternative interventions.

- ✓ Schwartz (2005) compared the outcomes of Reading Recovery® students during the first and second semesters of the school year and concluded that Reading Recovery® students in the first half of the year performed better than students in the second half of the year (Reynolds, 2009).

Conflicting Views

There are conflicting perspectives on the research studies surrounding Reading Recovery® .

Other issues presented regarding the WWC findings include the use of the Ohio Word reading test as a measure of phonics when it is actually a sight word vocabulary test (Adams, 1990). However, the Reading Recovery® studies also used the Yopp-Singer Phoneme Segmentation Test and a phoneme deletion task.

Concerns were also expressed regarding the use of Clay's *Observation Survey of Early Literacy Achievement* as the measure of success since it is "a closed set of data" meaning that no other interventions use that assessment so it cannot be readily compared. However, a recent study addresses this concern by investigating the correlation of the *Observation Survey* with the *Iowa Test of Basic Skills* (ITBS). Both instruments yield similar results in identifying low readers. The items between the two instruments are highly correlated; most correlations are statistically significant and meaningful (Gomez-Belenge, Rodgers, Wang, Schulz, 2005).

In addition, Reynolds questions the objectivity of the Reading Recovery® test results when the assessments are administered more than once in a short period by the teachers who work with the students (Reynolds, 2009). However, it should be noted that Reading Recovery® uses alternate forms for each of the assessment tasks, trains Reading Recovery® teachers in test administration, and requires that teachers not assess their own students.

In conclusion, Slavin cautioned that, as the findings of research syntheses from the WWC are relatively "high stakes," it is "essential that the conclusions be correct, but also that the process by which they are arrived at be open, consistent, impartial, and in accordance with both science and common sense" (2008, p. 7).

Do the effects of Reading Recovery® last over time?

There are data to support that a large majority of students with complete Reading Recovery® interventions are successful in reaching average literacy performance with some evidence of long-lasting effects. (Askew, Kaye, Frasier, Mobasher, Anderson and Rodríguez, 2002; Brown, Denton, Kelly & Neal, 1999; and Rowe, 1995). MMSD's analysis of the data shows that approximately 70% of discontinued students and about a third of students who are recommended for further support or have incomplete programs fall in the proficient to advanced ranges of literacy performance on state tests throughout their academic careers. This is a great achievement for students who started out as the lowest functioning literacy learners.

Replication studies document outcomes for all students served in Reading Recovery® (Cosgrave, Bennie & Kerslake, 2002) including students served in Spanish (Escamilla, 1994). One study examines the impact of Reading Recovery® practices implemented using Descubriendo La Lectura, the Spanish version of Reading Recovery® . This study found that high-need students who received Descubriendo La Lectura in first grade, performed equally as well as other students in the class who did not receive the intervention with effects lasting into second and third grade (Escamilla et al, 1998).

Hurry and Sylva (2007) found that Reading Recovery® had a significant effect for a subgroup of children who were non-readers at the age of six. These students made more progress than control groups during the year they received service. Their reading achievement

was not sustained, but actually declined to more than two years below age expectations over time (Reynolds, 2009). Center et al. (1995) found that Reading Recovery® intervention achieved significant short-term gains on a number of reading measures. Schwartz et al. (2009), from the Reading Recovery® group, carried out an additional analysis of the Center et al. data at a testing point in mid-second grade, one year after the first post-test. Their conclusions from this quasi-experimental comparison were that the Reading Recovery® students retained gains on all assessments, five of which were not part of the Reading Recovery® assessment battery. There is, however, a gradual decrease in effect size over time (Reynolds, 2009).

The study by WCPSS (1995) a large school district in North Carolina, determined that Reading Recovery® did have some positive impact on students' need for additional reading services in second grade, but the impact did not extend beyond that. These studies suggest that Reading Recovery® alone may not be enough to support all of our most school-dependent readers across the years. MMSD data analysis reveals similar outcomes.

Response to Intervention

Schwartz et al. states that Reading Recovery® operates as a "Response to Intervention (RTI) approach to support the identification of students with learning disabilities related to literacy" (2009, p. 10). Response to intervention refers to practices promoted by the reauthorization of the Individuals with Disabilities Education Improvement Act (IDEA) of 2004. This reauthorization gave states and school districts approval to implement early intervening services for students prior to placing them in a special education program. These early intervening services provide tiers of intervention that increase in intensity and focus on individual student need. Using this model, teachers regularly and systematically monitor individual student progress in order to measure the success of each intervention (NASDSE, 2005). This response to intervention model is referred to as RTI.

A goal of RTI is to reduce the number of students inappropriately placed in special education because of inadequate instruction. The data collected by some school systems indicate that Reading Recovery® has helped them meet this goal. A school system in Livonia, Michigan, found the percentage of children qualifying for learning disability services was cut in half and the savings realized by Reading Recovery® (through reduced retentions, referrals, and special education services) allowed the system to significantly reduce class size in the primary grades without an increase in budget (Gage,1999). Other systems report reductions in the numbers of self-contained special education classes or in special education teaching positions (Assad & Condon, 1996; Lyons & Beaver 1995). In contrast, the WCPSS data analysis discovered the special education placement was similar for Reading Recovery® students and students in a control group. Both groups had a 12% placement rate. Reading Recovery® had no significant impact on student special education placement or retention (WCPSS, 1995). In the WCPSS abstract the researchers note that the school system did not follow guidelines to fully implement the Reading Recovery® program.

Is Reading Recovery® cost effective?

Because Reading Recovery® intervenes so early in a child's formal schooling, it is possible that some of the students receiving intervention would have reached proficiency without it (Center, et al., 2005). The one-to-one instruction of Reading Recovery® confirms it as an intense intervention. However, as implemented in MMSD it often occurs as the first intervention. The availability of early interventions varies from school-to-school in MMSD.

Summary

The research around early reading intervention illuminates the complex decision making required to meet individual student literacy needs. There seems to be no one right answer, no quick fix for success. While recent research brings up questions as to the cost/benefit of Reading Recovery®, what other supports and options are available? One thing is certain, alternative interventions must be in place prior to removing current systems.

MMSD DATA ANALYSIS READING RECOVERY®
PART II

Executive Summary

The second part of this study focuses on analyzing MMSD data for Reading Recovery® students receiving services for 2005-06 through 2008-09 school years. The approach relies on longitudinal data wherever possible. More recent assessment data particularly that derived from the District's Primary Language Arts Assessment (PLAA) and student quarter grades are the basis for many of the pre- and post-treatment measures. The study also attempts to define procedures that might better identify students who would be most likely to benefit from the Reading Recovery® program.

Key Findings

- Nationally reported figures indicate that approximately 60% of all students who receive Reading Recovery® are discontinued. In Madison, discontinued generally indicates grade level proficiency at the end of 1st grade. There is some evidence that the overall program effects are greatly improved by achieving a 60% discontinuation rate. Madison has been below this figure for the past 3 years.

- Reading Recovery® clearly serves a population of needy students based on income and other demographic factors.

- When combining all Reading Recovery® students over an entire school year of service, the overall program impact does not yield statistically significant achievement gains when comparing the performance of participants to similar but non-participating students after controlling for intervening affects (e.g., poverty, special education status, parent education, etc.). In 2008-09, significant and positive effects were found when looking at round 1 and 2 students separately. Students who did not have a pre- and post-score were excluded from the analysis. In 2006-07, after controlling for the characteristics of students, the overall effect was negative. 2006-07 also had the lowest discontinuation rate of all years' studied. Effectiveness of the Reading Recovery® program appears to vary from year-to-year and is (as expected) highly correlated with the program discontinuation rate.

- From 2006-07 to 2008-09, 13% of all first grade students received Reading Recovery® services. Forty-nine percent of all students receiving Reading Recovery® were discontinued. In 2008-09 forty-two percent (42%) of students were discontinued. For the past 3 years the discontinuation rate has been 50% or less.

- In general, Reading Recovery® students participating in round 1 tended to have higher text reading level gains compared to demographically similar, but non-participating students. However, when combining all Reading Recovery® students for an entire school year including rounds 1, 2 and 3 the overall program does not yield statistically significant achievement gains when comparing performance of participants to similar but non-participating students. In the 2008-09 school year the effect was positive overall, but not statistically significant.

- It appears that some students do benefit from Reading Recovery® intervention more than others. For example, those students participating in the first series of sessions of the school

year known as round 1 as well as students who have very low beginning text reading level scores prior to Reading Recovery® (less than 2 for 2008-09) have significant gains in comparison to similar, but non-participating students, although they may not be proficient by the end of Grade 1. Students who start with higher text reading levels seem to have lower text reading level gains than similar students who did not receive Reading Recovery® as do students who participate in Reading Recovery® in the later sessions of the school year (i.e., rounds 2 and 3). Although it appears that round 2 and 3 students do not make great gains in Reading Recovery®, these children are chosen at semester because their first semester gains in the classroom without intervention were minimal. However this suggests a need for better methods to identify students who would most benefit from Reading Recovery® as well as consideration of program delivery across the school year.

- This study finds a benefit in the first grade year for students who are successfully exited (i.e., discontinued) from the Reading Recovery® program. Most of these students change their status from at-risk for reading failure to proficient readers during their first grade year (some students do not appear to be at-risk based on their Kindergarten PLAA scores).

  It appears that higher discontinuation rates are needed to demonstrate an overall effective Reading Recovery® program in Madison. Discontinued students, on average, are proficient at the end of 1st and 2nd grade. Other outcome students (recommended, incomplete), in general, do not reach proficiency in 1st grade or later in their school careers in MMSD. There may be other benefits for these non-discontinued students, but this study does not find evidence of an effect on grade 1 and grade 2 reading levels.

Structure of MMSD Data Analysis Report

The following MMSD report looks at the years 2005-06 to 2008-09 and uses several approaches to evaluate the outcomes of Madison Reading Recovery® students. This study also looks at how the District can better identify students who would benefit most from the Reading Recovery® intervention.

The report is organized in the following fashion:

1. Descriptive information on the Reading Recovery® program by outcomes and demographics
2. Impact of MMSD Reading Recovery® program on student achievement
3. Use of predictive models to identify students who would be successful in Reading Recovery®
4. Cost Analysis

1. Reading Recovery Student Characteristics and Program Outcomes

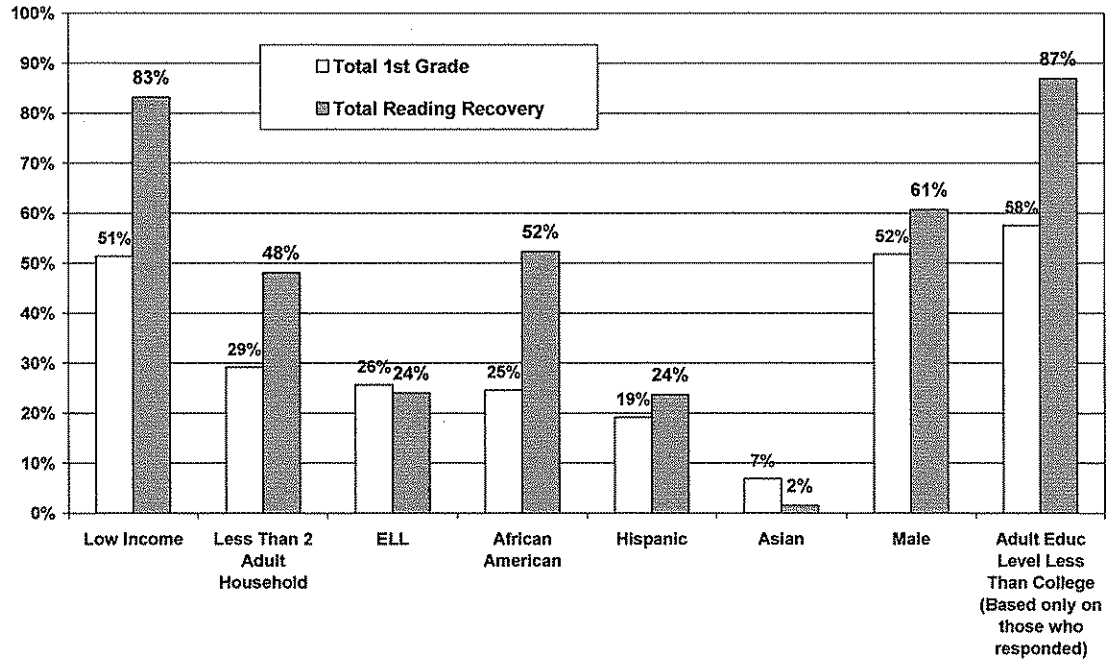
A. Characteristics of the Reading Recovery® Population

Appendix A describes the Reading Recovery® process for selecting students for the program. Not surprisingly, because the program targets struggling readers, the Reading Recovery® student population differs from the total District grade 1 population. In the 2008-2009 school year, Reading Recovery® students were more likely than the District grade 1 population as a whole to be:

- low income (83% Reading Recovery® vs. 51% District),
- live in a household with less than two parents (48% Reading Recovery® vs. 29% District),
- African American (52% Reading Recovery® vs. 25% for the District)
- live in a household where the parent has less than a college education (87% vs. 58%) and
- Male (61% vs. 52%).

Figure 1 illustrates the differences between the Reading Recovery® students and the general grade 1 population for the 2008-09 school year.

Figure 1: Reading Recovery Compared to District Grade 1 School Year 2008-2009



These demographic differences are not unexpected as the relationships between such characteristics and student achievement are well-documented. The very purpose of Reading Recovery® suggests that the program will more often serve certain groups.

In addition to demographics, as could be expected based on the program identification criteria, Reading Recovery® students have lower scores than other first graders on language arts assessments in Kindergarten.

The Reading Recovery® student selection procedure has Kindergarten teachers rank students low to high on literacy. The lowest students are then administered the Observation Summary, a Reading Recovery® battery of assessment information. Based on a review of all of subtests and their summary scores, students are ranked and placed in Reading Recovery® beginning with the lowest readers first.

Children in rounds 2 and 3 in the middle of the school year are chosen to be assessed from those whose teachers rank them as the lowest functioning in their classrooms (based on teacher observations and PLAA assessments). This group of students is then given all the subtests of the Observation Survey. An analysis of these test results is used to determine who the lowest functioning student to be selected is.

The data used to select Reading Recovery® students is not available on MMSD's student data system. The following table uses the end of Kindergarten text reading level to identify the lowest 20% of students for the 2008-09 school year. Approximately 20% of all students in Grade 1 in 2008-09 scored a 0 or 1 on the Primary Language Arts Assessment text reading level at the end of Kindergarten. There is a high correlation between this and the end of Grade 1 text reading level (.732, sign at .000).

This is different from the Reading Recovery® method (about 70% of Reading Recovery® students scored a 0 or 1 while 30% were higher) but might serve as a reasonable comparison group to Reading Recovery® students.

Table 1
2008-2009 School Year Participation in Reading Recovery
Who gets Reading Recovery? Based on PLAA End of Kind Text Reading Level

School	Top 80%		Lowest 20%			% Lowest 20%
	No RRC	RRC	No RRC	RRC	Total RRC	Receiving RR
Allis	32	6	4	7	13	64%
Chavez	76	0	12	8	8	40%
Crestwood	52	3	6	3	6	33%
Elvehjem	55	2	4	6	8	60%
Emerson	39	0	8	3	3	27%
Falk	33	3	5	10	13	67%
Franklin	115	2	12	4	6	25%
Glendale	42	1	7	6	7	46%
Gompers	**31**	**0**	**8**	**0**	**0**	**0%**
Hawthorne	34	3	0	12	15	100%
Huegel	35	0	6	6	6	50%
Kennedy	86	2	6	5	7	45%
Lake View	28	4	6	4	8	40%
Lapham	**63**	**0**	**4**	**0**	**0**	**0%**
Leopold	84	7	13	15	22	54%
Lindbergh	21	6	0	2	8	100%
Lowell	27	5	7	7	12	50%
Mendota	37	5	6	7	12	54%
Midvale	71	7	9	8	15	47%
Muir	46	4	2	2	6	50%
Nuestro Mundo	25	0	3	0	0	0%
Olson	35	0	7	7	7	50%
Orchard Ridge	30	2	2	7	9	78%
Sandburg	40	1	10	6	7	38%
Schenk	45	2	1	10	12	91%
Shorewood	**61**	**0**	**9**	**0**	**0**	**0%**
Stephens	59	0	9	8	8	47%
Thoreau	**38**	**3**	**6**	**3**	6	33%
Van Hise	**37**	**0**	**6**	**0**	**0**	**0%**
Total	1377	68	178	156	224	47%

Bold Schools do not have Reading Recovery

Students in bilingual (Glendale, Midvale, Sandburg, Leopold) programs are not considered for Reading Recovery® although their PLAA scores would place them in the bottom 20%. In addition, some low text reading level students might be special education. Reading Recovery® does serve some special education students, although, other than those receiving speech & language services, this is rare. The above table is designed to show that not all students who score low on reading tasks at the end of Kindergarten receive Reading Recovery® services, partly due to a lack of available slots. About half the students in this group (end of Kindergarten text reading level of 0 or1) received Reading Recovery®. It is difficult to accurately define the students who are in the lowest 20% but this table indicates that there are probably significant numbers of students who need help with literacy but either do not have the opportunity to receive Reading Recovery® (not available at their school) or Reading Recovery® did not identify them or was unable to place them.

The District has used a formula to identify students at-risk for being below proficient at the end of 1st grade using information available at the end of Kindergarten. Probabilities are available for 2 cohorts: 2007-08 and 2008-09. Most students selected to receive Reading Recovery® were students who also were at-risk for not meeting reading proficiency by the end of 1st grade based on this predictive model. About five percent of Reading Recovery® students in 2008-09 had a high likelihood of reading proficiency at the end of 1st grade. This probability, which is calculated at the beginning of 1st grade using a statistical model based on prior information, might be of some use when selecting Reading Recovery® participants as a means of identifying students most likely to achieve proficiency without the aid of the program intervention. Doing so might improve the overall effectiveness and cost-efficiency of the program. There were several students who had advanced reading levels at the end of Kindergarten who received Reading Recovery® services in 2008-09. This placement is a result of the current model used to implement Reading Recovery® in MMSD which spreads Reading Recovery® allocations across schools varying according to socioeconomic status.

B. Program Outcomes

There are four outcomes defined by Reading Recovery®:

1. Discontinued – student is meeting grade level expectations in reading and writing. Nationally, Reading Recovery® Council of North America reports that 75% of students who are either discontinued or have had a full intervention (defined as 12-20 weeks - Source: http://www.readingrecovery.org/reading_recovery/facts/index.asp) meet this goal. Nationally, the discontinuation rate for all students who receive Reading Recovery® is about 60%.

2. Recommended – defined as students who are still having difficulty after a complete intervention and require additional evaluation and/or support.

3. Incomplete – In Madison, a significant percentage of Reading Recovery® students are exited from the program as incomplete. On average, students marked incomplete receive 10 weeks of Reading Recovery® and do not meet grade level expectations upon exiting the program.

4. Other – Outcome does not fit any of the above categories or student moved (e.g., moved, etc.).

Many students who start in the second round or later do not have the opportunity to finish the program because there isn't enough time left in the school year.

Table 2 reports on the outcomes for Reading Recovery® students from 2005-06 to 2008-09.

Table 2: Reading Recovery Outcomes - Student Counts, Average Lessons

	Discontinued			Recommended			Incomplete			Other			Total			
Year	N Students	Pct of Students	Average Lessons	N Students	Pct of Students	Average Lessons	N Students	Pct of Students	Average Lessons	N Students	Pct of Students	Average Lessons	N Students	Average Lessons	3rd Friday Grade 1 Enrollment	% Receiving Reading Recovery
2006	175	62%	60.3	53	19%	74.2	43	15%	51.4	12	4%	27.5	283	60.1	1957	14.5%
2007	107	41%	60.2	67	26%	75.9	58	22%	55.3	27	10%	39.3	259	61.0	2074	12.5%
2008	130	50%	62.6	60	23%	72.3	49	19%	54.5	20	8%	30.1	259	60.9	2004	12.9%
2009	110	42%	63.3	76	29%	71.1	54	21%	56.2	22	8%	37.1	262	61.9	2006	13.1%
4 Year Avg	131	49%	61.5	64	24%	73.3	51	19%	54.5	20	8%	34.7	266	61.0	2010	13.2%

Table 2 shows that 49% of all Reading Recovery® students have been discontinued (i.e., successfully graduated) in the past 4 years but the rates have varied quite a bit (62% in 2005-06, 41% the following year). In these four years, roughly one in five (19%) of all participating students were incomplete.

A third group of students cited by the program are students recommended for other services. In 2008-09, 29% of all Reading Recovery® students were recommended which means at the end of the intervention they did not meet grade level expectations and were referred for other services. This was the highest percentage of recommended students since the program's implementation in Madison. There is a large variation between years with, for instance, percent discontinued decreased from 62% in 2005-06 to 41% the following year. Some of this variation is due to changes in the demographics of students receiving Reading Recovery®.

Table 3: How have Reading Recovery students changed in the past 4 years?

	2006	2007	2008	2009	Significant?*
Fall Observation Summary Scores for All Reading Recovery Students:					
Letter ID	45.6	43.7	43.8	44.0	
Word	1.8	1.6	2.0	1.7	
Concepts About Print	12.4	12.0	11.6	11.5	
Writing Vocabulary	8.0	5.9	7.2	5.5	2006 > 2007 & 2009; 2008 > 2009
Dictation	16.2	13.1	14.2	12.9	2006 > 2007 & 2009
Text Reading Level	0.7	0.6	0.7	0.5	
Demographics					
English Language Learners - Start of Grade 1	19%	25%	29%	22%	2008 > 2006
Low Income	79%	86%	84%	83%	
Male	52%	62%	60%	61%	
African American	45%	47%	46%	52%	
Hispanic	16%	20%	20%	24%	
White	28%	24%	22%	17%	2006 > 2009
Two Adult Household	50%	53%	56%	52%	
Special Ed - Start of Grade 1	14%	16%	15%	22%	

*Results are based on two-sided tests assuming equal variances with significance level 0.05.

Table 3 shows that scores on the two observation summary tasks – Writing Vocabulary and Dictation were significantly lower in 2007 and 2009 compared to the 2006 cohort. The only demographic differences over the past 4 years that were significant were English language learners in 2008 compared to 2006 (29% of Reading Recovery® students were ELL in 2008 compared to 19% in 2006) and the proportion of Reading Recovery® students who were White was significantly lower in 2009 compared to 2006 (17% vs. 28%). These changing demographics and incoming scores may account for some, but not all, of the changes in discontinuation rates over the years. In 2006-07 there was only one teacher leader to coach the Reading Recovery® teachers; in prior years, there were two. Also in 2006-07 there was a change in the curriculum mandated by the Reading Recovery® Council that involved much staff development time. Another variable may be that 22% of the Reading Recovery® staff were new to their positions in 2008-09. It would be beneficial to examine the specific changes made to determine how they affected the drop in the proportion of students being discontinued

Table 4 compares Madison outcomes to those reported nationally by the Reading Recovery® Council of North America for the entire country for the past 4 years. Nationally, there has been a significant decline in the number of students receiving Reading Recovery® in the past four years while Grade 1 populations have been stable (Sources

http://www.idecweb.us/Documentation.asp,
http://nces.ed.gov/programs/projections/projections2017/tables/table_03.asp?referrer=list).

Due to the high cost of Reading Recovery®, this may mean that more prosperous school districts are likely to offer Reading Recovery®.

Table 4 also illustrates how Madison outcomes have compared to the national rates. Madison has been below the national average in terms of discontinuation for the past 3 years. Perhaps this is because MMSD does follow the national Reading Recovery® standards and guidelines which recommend fully implementing each school rather than distributing allocation across more schools. Full implementation would be serving the lowest 20% of all first graders in each school.

Table 4 - Comparison of Madison and National Reading Recovery® Outcomes

National Reading Recoveyr Reports
Source: http://www.idecweb.us/Documentation.asp
Reading Recovery National Statistical Abstract for the United States

Outcome by %	2005-06	2006-07	2007-08	2008-09
National Discontinued	59%	57%	59%	60%
MMSD Discontinued	62%	41%	50%	42%
National Recommended	19%	21%	20%	20%
MMSD Recommended	19%	26%	23%	29%
National Incomplete Program	15%	16%	15%	14%
MMSD Incomplete Program	15%	22%	19%	21%
National Other Outcome	7%	7%	7%	6%
MMSD Other Outcome	4%	10%	8%	8%

					4 Year Chg
National Total # RR Students	**107744**	**98060**	**89765**	**82125**	-24%
MMSD Total # RR Students	**283**	**259**	**259**	**262**	-7%

2. Impact of MMSD Reading Recovery Program on Student Achievement

How did Reading Recovery® participants perform on the spring grade 1 PLAA text reading level compared to other students, controlling for prior achievement baseline data and other factors (poverty, gender, ethnicity, attendance, etc.)?

To answer this question, three different approaches were used. Simple t-tests were used for the past year (2008-09) using those students who had a text reading level at the end of Kindergarten less than two. A text reading level of three is considered proficient at the end of Kindergarten. Approximately 20% of all students at the end of Kindergarten have a text reading level of zero or one. This simple approach excludes 30% of Reading Recovery® students (who had a reading level higher than one at the end of Kindergarten). It also does not take into account a variety of factors that influence both the selection into Reading Recovery® as well as achievement at the end of Grade 1 (e.g. attendance, mobility, parent education, poverty, etc.).

In addition, a regression analysis was run using all students with data. The analysis controlled for a variety of factors that could influence student achievement at the end of Grade 1. The Reading Recovery® variable (treatment) was the number of lessons administered. This approach is similar to that used in the value-added analyses of WKCE test scores.

The third statistical model applied to the Reading Recovery outcome data was a quasi-experimental matched group. The group was formed (using a propensity score) to duplicate a random sample as closely as possible. Using this data, a separate regression analysis was run using only those matched students. This approach also uses a method similar to the value-added models.

In addition to these statistical models to measure effects we also reviewed the long-term sustained effects of Reading Recovery. The analysis applied to the data in this report was fairly limited. Previous MMSD analyses conducted in the past showed limited sustained gains for the program overall. However, this effect does differ based on the outcome achieved by the Reading Recovery student.

A final analysis was conducted on the individual teacher effects on Reading Recovery student outcomes. Again, similar to the concept of value added, this analysis was limited to simple descriptive statistics. The analysis does suggest variation across teacher in terms of student outcomes.

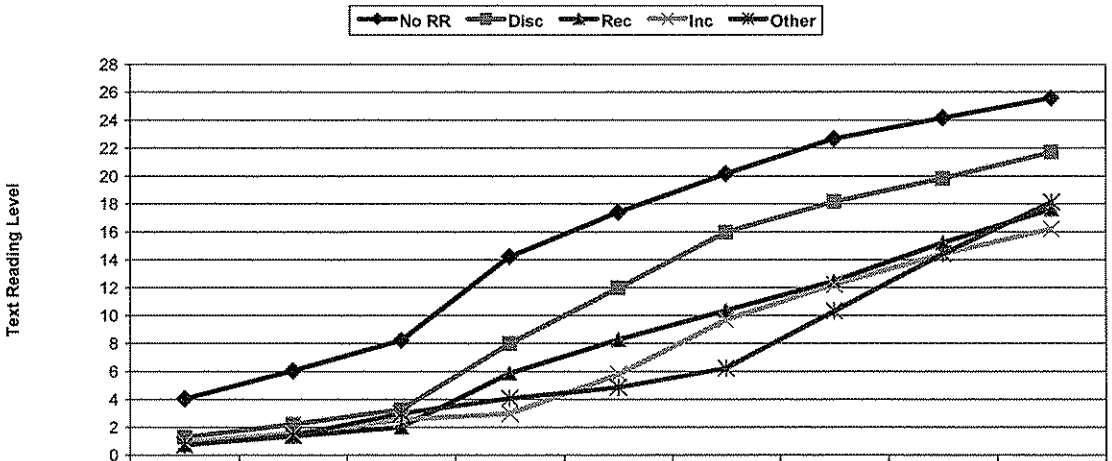
When reviewing these analyses, it is important to keep in mind that **all** students in grade 1 are gaining text reading levels. Students naturally at this age (maturation) gain knowledge and experience. Also, students in MMSD have a two hour literacy block each day in their regular education classroom. This analysis attempts to isolate the effect of Reading Recovery® – which is administered to participants five days a week, 30 minutes per day – beyond the effects of other literacy instruction students are receiving in their classrooms and any other factors (e.g., maturation, socio-economic characteristics, etc.). Also, some schools do not have Reading Recovery® but probably use other approaches to assist students who enter first grade with low overall reading scores.

Practically all students in Grade 1 make gains in terms of their text reading levels. For the 2007-08 school year there are extensive records of students' text reading levels from Kindergarten through the end of grade 2. This is because of the standards-based elementary grading system in place within the District and the local criterion referenced assessments known

as the Primary Language Arts Assessment (PLAA) which is administered to all students. Figure 2 shows the average text reading levels by quarter for the 2007-08 Grade 1 cohort. Figure 2 shows that all students, on average, are gaining as they progress from Kindergarten to Grade 2 but the rates of growth and attainment are quite different.

Figure 2

Reading Recovery 2007-08 Longitudinal Grades Text Reading Level (0-30) Proficienty at Grade 1 = 16, Grade 2 = 22



	Kind Term 2 TRL	Kind Term 3 TRL	Kind Term 4 TRL	Gr 1 Term 2 TRL	Gr 1 Term 3 TRL	Gr 1 Term 4 TRL	Gr 2 Term 2 TRL	Gr 2 Term 3 TRL	Gr 2 Term 4 TRL
No RR	4.05	6.05	8.23	14.24	17.41	20.17	22.69	24.17	25.59
Disc	1.30	2.21	3.29	8.00	11.99	16.00	18.17	19.83	21.72
Rec	0.75	1.37	2.02	5.88	8.28	10.38	12.48	15.24	17.62
Inc	0.94	1.58	2.58	2.99	5.79	9.70	12.23	14.44	16.22
Other	0.73	1.43	3.00	4.09	4.86	6.25	10.33	14.43	18.14

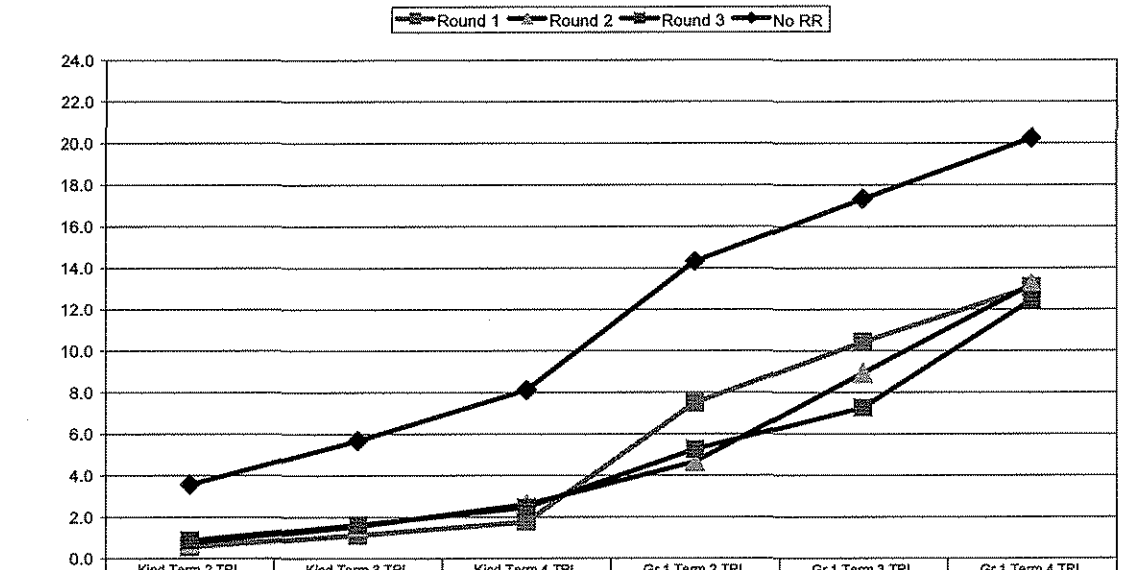
Gradomg

As Figure 2 shows, discontinued students from the 2007-08 cohort, on average, are proficient by the end of grade 1 (text reading level = 16). Most discontinued students remained proficient or close to proficient in terms of text reading level by the end of grade 2 (text reading level = 22). As might be expected, other outcomes (incomplete and recommended) have lower text reading levels at the end of grade 1 and grade 2 and on average are not proficient. Reading Recovery®'s basic goal as stated on their website is "...75% of students (in the lowest 20%) who complete the full 12- to 20-week intervention can meet grade-level expectations in reading and writing." A significant proportion of Reading Recovery® students in Madison have outcomes other than discontinued. Reading Recovery® students, who were not discontinued, on average, had a text reading level of 10 or less at the end of Grade 1. Obviously Reading Recovery® students are not similar to most students who meet grade level expectations by the end of Grade 1.

Students receiving Reading Recovery® generally all end up at an average text level 13 regardless of the round in which they receive the intervention. This can be shown looking at students' text reading level grades from Kindergarten to the end of Grade 1. Figure 3 shows the similarity of outcomes for Reading Recovery® students by round (1,2,3). This data (grades through Grade 1) is available for the 2007-08 and 2008-09 school years.

Figure 3

2007-08 and 2008-09 Text Reading Level Grades
Kind to Grade 2 RR and No RR by Round



	Kind Term 2 TRL	Kind Term 3 TRL	Kind Term 4 TRL	Gr 1 Term 2 TRL	Gr 1 Term 3 TRL	Gr 1 Term 4 TRL
Round 1	0.6	1.1	1.8	7.5	10.4	13.1
Round 2	0.8	1.6	2.6	4.7	8.9	13.2
Round 3	0.9	1.6	2.5	5.3	7.3	12.5
No RR	3.6	5.7	8.1	14.3	17.3	20.3

A. Comparison Using Lowest 20 Percent of Students (T-Tests)

The most straightforward comparison group would be to identify those students at the beginning of 1st grade who had low text reading level scores at the end of Kindergarten. In 2008-09 about 20% of all 1st graders who had a Kindergarten PLAA text reading level scored zero or one. This group makes a simple comparison group for the Reading Recovery® students. It should be pointed out that 30% of the Reading Recovery® students are not included in this analysis as they had text reading levels higher than one at the end of Kindergarten and a few even had text reading levels as high as five. Proficiency at the end of Kindergarten is a text reading level of three or higher.

Table 6

T-Tests - Reading Recovery Compared to District Spring Grade 1 TRL 2008-2009
Lowest 20% Based on End of Kinder Text Reading Level 0 or 1

2008-09			n	Mean	Std Dev	Std Err of Mean	t	df	Sig. (two-tailed)		Mean Diff
All Students Lowest 20%	All Students	Non RR	135	11.6	5.8	0.5	-1.07	251	0.288	NS	0.67
Based on End of Kinder		RR	140	12.2	4.5	0.4					
Text Reading Level	Low Income	Non RR	93	10.5	5.8	0.6	-1.73	169	0.085	NS	1.26
0-1		RR	116	11.8	4.4	0.4					
	LEP	Non RR	42	11.6	5.7	0.9	-0.40	71	0.693	NS	0.43
		RR	37	12.0	3.8	0.6					
	Afr Amer	Non RR	42	10.6	6.2	1.0	-0.80	69	0.428	NS	0.88
		RR	69	11.5	4.7	0.6					

Table 6 shows no significant differences in terms of end of Grade 1 text reading level between students who received Reading Recovery® and those who did not. Significance is usually a less than 5% probability that any difference between the two groups is not due to chance. Reading Recovery® students do have higher text reading levels for all students and for all the subgroups shown. The effect on low income is positive and close to being significant. It is important to keep in mind that a significant proportion of Reading Recovery® students are not included in this analysis (those who had a higher text reading level at the end of Kindergarten as well as those lacking a score either end of Kindergarten or end of Grade 1). Significant differences between those included and excluded were Kindergarten text reading level, sound word, letter ID and concepts about print. Excluded students were significantly less likely to be special education at the beginning of 1st grade (11% vs. 26%). Also, excluded students were significantly less likely to be recommended (9% vs 41%).

Table 7

Comparison of Reading Recovery® Students Excluded/Included in T-Test

Comparison of Reading Recovery Students Included Excluded						
Based on End of Kindergarten Text Reading Level						
21% of All Kindergarteners had a 0 or 1 Text Reading Level						
Independent Samples T-Test						
	RR Included in Analysis Kind TRL 0-1		RR Excluded from Analysis Kind TRL 2+			
Group	N	Mean	N	Mean	Difference Between Include/Exclude	Significant?
Kind PLAA Text Rdg Level	**156**	**0.8**	**68**	**2.9**	**-2.1**	**Yes*****
Kind PLAA Sound Word	**152**	**19.0**	**65**	**23.6**	**-4.6**	**Yes*****
Kind PLAA Dictation	132	16.2	60	23.9	-7.7	No
Kind PLAA Concepts About Print	**155**	**10.7**	**60**	**16.9**	**-6.1**	**Yes*****
Kind PLAA Letter ID	**151**	**46.9**	**65**	**52.3**	**-5.4**	**Yes*****
Male	156	61%	68	56%	5%	No
Black	156	52%	68	49%	3%	**No**
Hispanic	156	23%	68	28%	-5%	**No**
Asian, Not Southeast Asian	156	1%	68	3%	-2%	**No**
Southeast Asian	156	5%	68	3%	2%	**No**
White	156	17%	68	16%	1%	**No**
Par Educ HS Diploma	156	27%	68	29%	-2%	**No**
Par Educ Voc Tech	156	15%	68	15%	1%	**No**
Par Educ LT HS	156	7%	68	6%	1%	**No**
Par Educ Coll Deg	156	3%	68	6%	-3%	**No**
Par Educ Grad Prof	156	4%	68	4%	-1%	**No**
Par Educ No Info	156	44%	68	40%	4%	**No**
Two Adult Household	156	49%	68	59%	-9%	**No**
Gr 1 Spec Ed 3rd Fri	**156**	**26%**	**68**	**15%**	**11%**	**Yes****
LD	156	0%	68	0%	0%	**No**
AUT	156	0%	68	0%	0%	**No**
ED	156	1%	68	0%	1%	**No**
SL	156	17%	68	13%	3%	**No**
CD	156	1%	68	0%	1%	**No**
OHI	156	0%	68	0%	0%	**No**
KGAttRate	156	91.2	68	91.4	-0.2	**No**
KG Susp	156	7%	68	4%	3%	**No**
FreeLunch	156	81%	68	75%	6%	**No**
ReducedLunch	156	4%	68	3%	1%	**No**
Incomplete	156	21%	68	15%	6%	**No**
Recommended	**156**	**41%**	**68**	**9%**	**32%**	**Yes*****
Discontinued	156	26%	68	76%	-50%	**No**

Also this simple comparison group does not control for a variety of other factors that influence student outcomes as well as selection into the Reading Recovery® program (e.g. attendance, behavior, parent education, poverty, mobility, etc.). If students were more closely matched, it is possible that significant differences would be found.

B. Regression Analysis

This analysis is designed to measure the net effects of the MMSD Reading Recovery® program on student achievement.

Regression models were developed to isolate the effects of the Reading Recovery® intervention while simultaneously controlling for other intervening variables. These models included any students with test scores at the two points in time. Such factors as poverty, parent education level, special education status, English language learner status, student mobility, and other variables might account for some of the differences witnessed in student performance. In addition, the students' beginning points in regard to achievement effect where they perform at the conclusion of the school year as well and so a variable was incorporated in the models for that affect as well. The end result of the analysis is to determine the affect of the Reading Recovery® program after accounting for the affect of these other variables on student achievement by the end of grade 1. The treatment variable is the Reading Recovery® lesson.

Analysis was run for each year separately, 2005-06 to 2008-09. Comparisons were run separately using all students, round 1 students, round 2 and 3 students combined and students based on their text reading levels at the end of Kindergarten (grouped by their scores above/below a certain point).

Only about 70% of cases were included in this analysis (see Appendix D for missing case analysis for this regression). Students had to have both pre-test scores and post-test scores in order to be included. Obviously mobile students would be less likely to have both scores. Reading Recovery® students included in the analysis were more likely to be discontinued compared to Reading Recovery® students who were not included, so the interpretation of effects is somewhat limited in regard to students with other outcomes. Pre-scores were far more prevalent in 2007-08 and 2008-09.

Variables were used if they were significant (<=.05) in that year. Variables included were:

End of Kindergarten PLAA Scores
Text reading level
Concepts About Print
Dictation Task (Hearing Sounds in Words)
Sound/Word
Letter ID
Free/Reduced Lunch
Ethnicity
Gender
special education (Y or N) Beginning 1st Grade and Primary Disability
Days Enrolled in MMSD in Kindergarten
Days Enrolled in MMSD Grade 1
Tardies Grade 1
ELL (Y or N) Beginning 1st Grade
Kindergarten ACCESS Score
Attendance Rate Grade 1
Attendance Rate Kindergarten
Suspensions in Kindergarten or Grade 1
Number of Different MMSD Schools Attended Kindergarten/Grade 1 (Mobility)

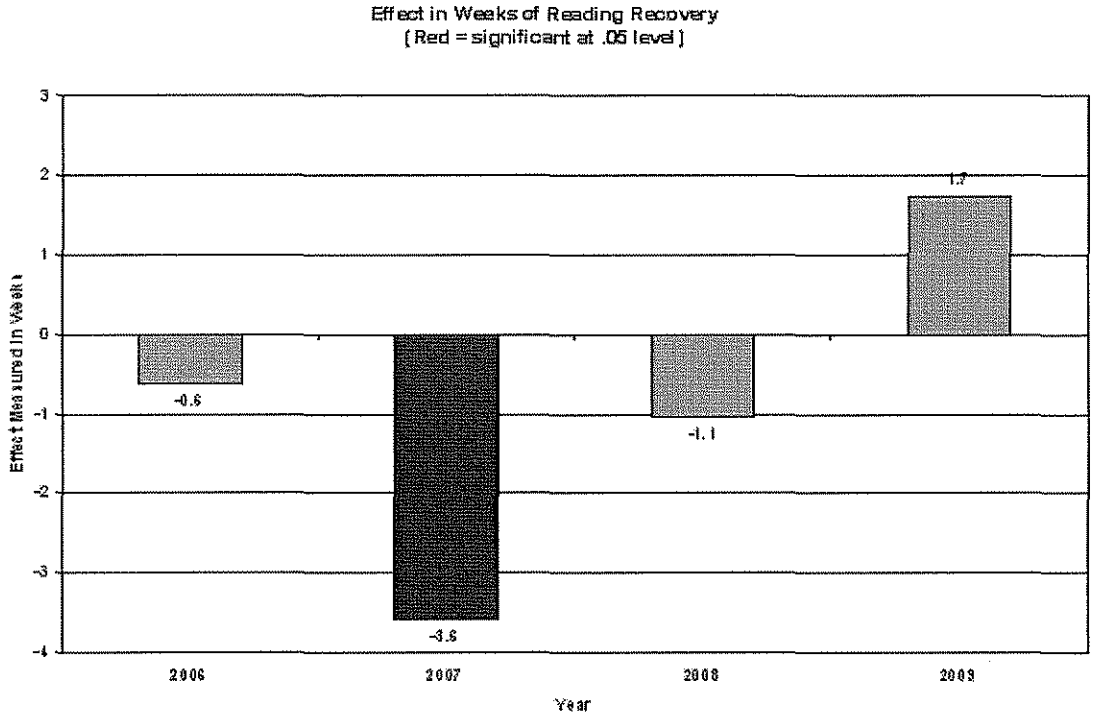
Parent Education
Two Parent Household

The outcome variable was the student's end of grade 1 text reading level score. The treatment variable was the number of Reading Recovery® lessons. The relationship between number of Reading Recovery® lessons and end of grade 1 text reading level is not linear so an adjustment was made to the lessons variable to take this into account. Students with great difficulties often receive more Reading Recovery® lessons than students who discontinue.

The following chart shows the effects of the Reading Recovery® intervention expressed in weeks gained/lost in terms of the text reading level achieved at the end of grade 1 holding other variables constant. Program effects were negative and significant (p value < = .05) in 2006-07 (a year where a low proportion of students were discontinued). Effects were not significant in any other year, but came close and were positive in 2008-09 (p value = .10).

This analysis does not take into account the different rounds. Different pre-scores effect placement into Reading Recovery® at round 2. This analysis simply takes into account where all students started at the end of Kindergarten and where they ended up at the conclusion of 1st grade. Although the round could have an effect, an examination of the end of year scores shows little difference in outcome between the rounds.

Figure 4



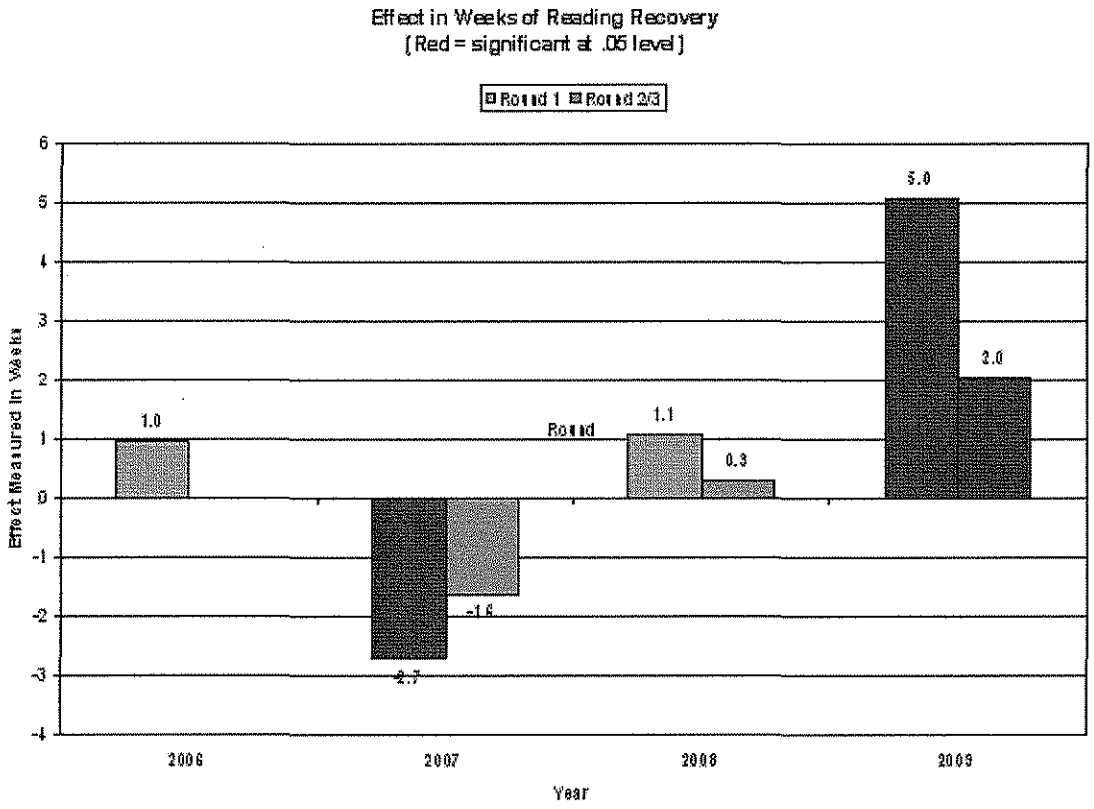
Results are mixed. 2008-09 is the most positive year in terms of gains made on text reading levels, but the gains are not significant.

Using the pre-score measured at the end of Kindergarten may have an effect due to the way Reading Recovery® is implemented. Students are placed according to need in round 1. When the student is exited, the next lowest student is placed. Reading Recovery® re-evaluates at the end of first semester and re-ranks the students from low to high. It would be interesting to see what students were in the lowest 20% according to Reading Recovery® but did NOT need Reading Recovery® in round 2. It is suggested that Reading Recovery® teachers use the District's student information system to record all observation summary results for students evaluated, and whether they actually received Reading Recovery®. This would allow a better analysis of who actually receives Reading Recovery® and who does not and why.

Students who start round 2 tend to have higher pre-score text reading levels. In the years 2007-2009, the Term 2 (mid-year) text reading level is available from the report card. This is used as the pre- score for round 2/3 students only. In 2006, the only pre-scores available were the end of Kindergarten Primary Language Arts Assessment scores. The following two tables show the effect for round 1 and round 2/3 students. The analysis shows positive effects for both round 1 and round 2/3 students in 2008-09. Effects were negative and significant for round 1 students in 2006-07. All other effects were not significant.

In 2006-07 there were significant changes in the teaching procedures from the prior year resulting in extensive staff development to retrain teachers in these new procedures. This may account for some of the decline in the percent of discontinued students compared to 2005-06. Also five teachers left from 2005-06 including the other teacher leader resulting in a significant decrease in coaching support for the Reading Recovery® teachers. In any case it would be interesting to note the changes made in that year as it seemed to result in a substantial decrease in the number of students discontinued.

Figure 5


Effect in Weeks of Reading Recovery
[Red = significant at .05 level]
Round 1
Round 2/3
Effect Measured in Weeks
Round
Year
2006
2007
2008
2009
1.0
-2.7
-1.6
1.1
0.3
5.0
2.0

C. Quasi-Experimental Matched Group (with regression analysis)

In order to form more appropriate comparison groups, a method called propensity scoring was used to create a comparison group for Reading Recovery® students within each school year cohort. This method begins by creating a predictive model for who will receive Reading Recovery®. For all students a propensity score is created that estimates the statistical likelihood that an individual student would receive Reading Recovery® based on pre-scores and demographic factors. This score is then used to pair Reading Recovery® students with a student who did not receive Reading Recovery®. The student with the propensity score closest to that Reading Recovery® student is the match. If a match is not within a statistically significant threshold of the matched case (i.e., the program was unable to find a close match) the case was not included in the analysis.

After the match, t-tests were conducted to assure that these were similar groups. Reading Recovery® is not available at all schools within the MMSD and, as Table 7 shows, there are a sufficient number of students with low literacy scores who do not receive Reading Recovery® to create valid comparison groups. For both groups, the comparison groups are very close in both school years. However, in 2008-09 there were differences in terms of gender and household configuration. This might limit the ability to draw conclusions regarding the effect on these two groups. Neither of these factors was significant in predicting the end of Grade 1 text reading level.

Achievement data for the 2007-08 and 2008-09 grade 1 cohorts were analyzed to determine whether Reading Recovery® students' performance was significantly different from the matched comparison group. The analysis compares end of grade 1 performance across the entire set of PLAA subtests.

There were no significant differences in terms of end of grade 1 text reading level in 2007-08 comparing Reading Recovery® students to the matched sample of similar students. In 2008-09 (Table 8) the analysis indicates that a Reading Recovery® student receiving 60 lessons would gain .8 text reading levels compared to a similar student who did not receive Reading Recovery®. This gain or 'value added' was significant. Reading Recovery® had more male students and had fewer students from two parent households compared with the matched non-participant group in 2008-09. In both years the overall program effect on text reading level was positive for Reading Recovery® participants compared with matched non-participants, but was only statistically significant in 2008-09.

Table 8

2008-09 School Year Reading Recovery and Comparison Group						
	Reading Recovery (n=231)	Comparison Non-Reading Recovery (n=231)	Sig.			
Average Scores:						
K PLAA Concepts About Print	12.5	13.0	0.39			
K PLAA Sound or Word	20.7	20.9	0.69			
K PLAA Hearing Sounds	19.0	19.7	0.42			
K PLAA Text Reading	1.5	1.7	0.07			
K PLAA Upper Case	24.6	24.0	0.21			
K PLAA Lower Case	24.3	23.9	0.33			
Demographics (%):						
Male	**60%**	**50%**	**0.03**			
English Language Learner	25%	29%	0.39			
Low Income	81%	77%	0.17			
Two or More Adults in Household	**53%**	**67%**	**0.00**			
Parent Coll Educ	14%	17%	0.58			
African Amercian	48%	42%	0.22			
Hispanic	27%	25%	0.75			
Asian	2%	3%	0.36			
Rates:						
Kind Attendance	91.2	92.2	0.17			
Red bold = significant at .05 level						
2009 Matched Sample	**2009**	**Unstandardized Coefficients**		**Standardized Coefficients**		
	Mean	**B**	**Std. Error**	**Beta**	**t**	**Sig.**
(Constant)		-14.198	3.841		-3.697	0.000
K Letter ID	49.29	0.209	0.031	0.309	6.822	0.000
K Text Reading Level	1.64	0.987	0.152	0.292	6.494	0.000
Gr 1 Special Education 3rd Friday	0.20	-2.462	0.537	-0.200	-4.581	0.000
Gr 1 Attendance Rate	93.60	0.169	0.039	0.186	4.356	0.000
Reading Recovery (Lessons)	**34.23**	**0.013**	**0.006**	**0.089**	**2.079**	**0.038**
Estimated Effect of RR on End of Grade 1 Text Reading Level			n			
No Reading Recovery	13.00		182			
Reading Recovery 60 Lessons	13.80		182			
Net Difference in TRL	**0.80**					
All Reading Recovery Status Included - Treatment variable is Number of Reading Recovery Lessons						

Table 9

2007-08 School Year Reading Recovery and Comparison Group	Reading Recovery (n=212)	Comparison Non-Reading Recovery (n=212)	Sig.
Average Scores:			
K PLAA Concepts About Print	14.6	15.1	0.25
K PLAA Sound or Word	19.0	20.0	0.15
K PLAA Hearing Sounds	18.2	19.4	0.17
K PLAA Text Reading	2.7	2.8	0.50
K PLAA Upper Case	23.0	23.0	0.88
K PLAA Lower Case	22.7	23.1	0.53
End of Grade 1 Text Reading	13.3	13.3	0.97
Demographics (%):			
Male	60%	57%	0.49
English Language Learner	31%	30%	0.83
Low Income	83%	81%	0.61
Two or More Adults in Household	59%	55%	0.43
Parent Coll Educ	8%	10%	0.50
African Amercian	43%	39%	0.43
Hispanic	21%	27%	0.14
Asian	1%	2%	0.48
Rates:			
Kind Attendance	93.7	94.6	0.19
Gr 1 Attendance	92.9	92.5	0.51

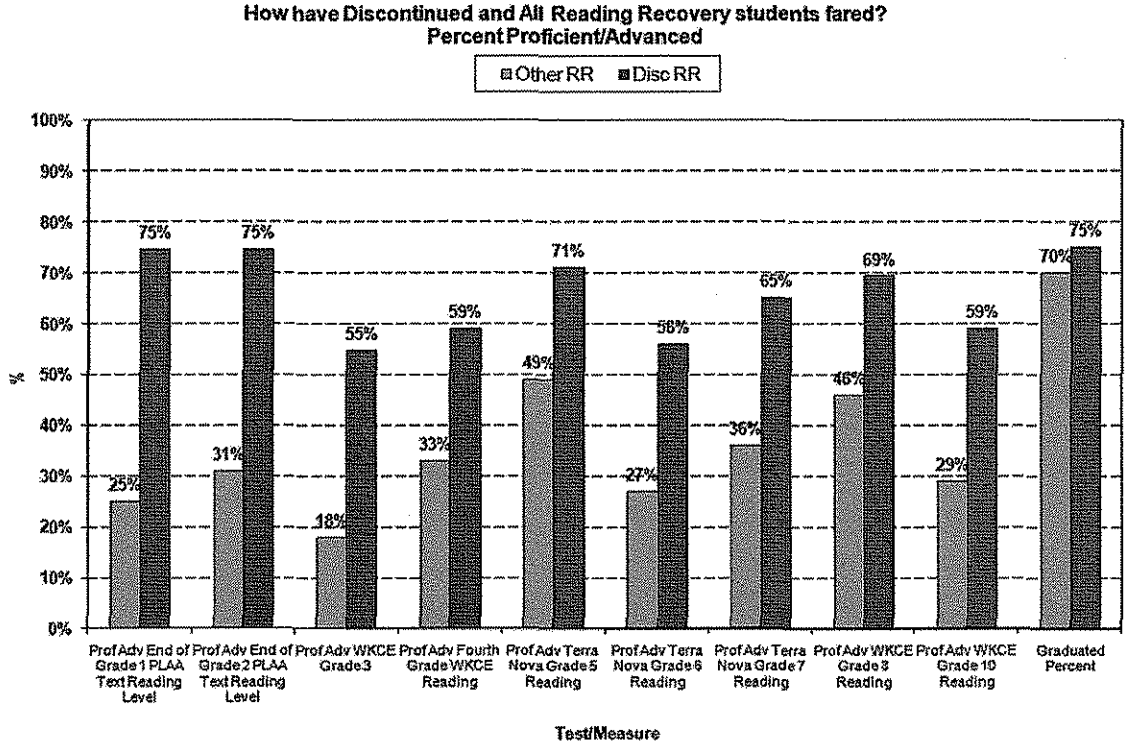
Red bold = significant at .05 level

2008 Matched Sample	2008	Unstandardized Coefficients		Standardized Coefficients		
	Mean	B	Std. Error	Beta	t	Sig.
(Constant)		9.668	0.802		12.051	0.000
K	18.95	0.160	0.029	0.283	5.515	0.000
K Text Reading Level	2.73	0.671	0.155	0.221	4.331	0.000
Gr 1 Spec Ed 3rd Fri	0.15	-3.179	0.672	-0.220	-4.730	0.000
FreeLunch	0.73	-1.583	0.519	-0.138	-3.052	0.002
Reading Recovery (Lessons)		**0.008**	**0.007**	**0.052**	**1.150**	**0.251**
Estimated Effect of RR on End of Grade 1 Text Reading Level			n			
No Reading Recovery	12.91		194			
Reading Recovery 60 Lessons	13.39		194			
Net Difference in TRL	**0.48**					
All Reading Recovery Status Included - Treatment variable is Number of Reading Recovery Lessons						

D. Long-Term Impacts

In addition to the one-year gains, the following chart looks at the later achievement of Reading Recovery® students after their 1st grade year. This includes any student who has had Reading Recovery® since the program first began in 1989-90. For the series of achievement tests available in the District's student information system, Reading Recovery® proficiency is shown in the following chart. Two groups of Reading Recovery® participants are shown – those successfully discontinued and all other participants. Previous research has been mixed in regard to long term effects of Reading Recovery®.

There is some evidence that students who received the program and were discontinued were proficient in reading in subsequent years. A much lower proportion of students who were defined with the Reading Recovery outcomes of recommended or incomplete were proficient in later years. This simple analysis only illustrates overall outcomes for Reading Recovery® students. In order to draw conclusions a more systematic analysis using comparison students would have to be conducted. In general, we can conclude that discontinued Reading Recovery® students have much greater success than other outcomes in later years.



E. Teacher and School Effects

There is also great variation between schools and teachers in terms of outcomes. As the following charts show, outcomes vary greatly between both teachers and schools. In 2008-09, the top 7 schools produced over 50% of the discontinued students. The bottom 7 schools produced less than 10% of the discontinued students.

2008-09 Discontinuation Rates by School

					Spring K Pre-Scores				*Spring Grade 1 Post Scores*			
RR School	# Students Receiving RR	# Discontinued	% Discontinued	% Discontinued	Text Reading Level	Dictation	Concepts About Print	Kind Letter ID	Text Reading Level	Sounds	Spelling	Editing
School 1	13	10	77%		1.8	17	16	50	15	44	10	2
School 2	18	13	72%		1.8	24	17	51	16	49	11	2
School 3	8	5	63%		1.5	22	12	46	15	46	11	3
School 4	12	7	58%		1.8	17	13	51	15	49	10	2
School 5	24	13	54%		1.5	18	11	46	13	48	10	2
School 6	8	4	50%		1.4	15	16	50	11	46	9	2
School 7	8	4	50%		1.5	23	12	51	12	47	10	2
School 8	8	4	50%		3.3	24	16	51	15	44	10	2
School 9	8	4	50%		2.0	23	17	47	15	45	10	2
School 10	8	4	50%		0.9	22	7	52	14	48	10	2
School 11	17	8	47%		2.0	23	15	52	13	46	10	2
School 12	8	3	38%		0.9	19	12	50	12	45	9	2
School 13	8	3	38%		1.6	18	16	50	12	41	9	2
School 14	8	3	38%		0.9	20	6	40	14	49	11	2
School 15	16	6	38%		1.1	19	12	49	11	46	9	2
School 16	8	3	38%		1.1	13	7	44	10	42	8	2
School 17	16	6	38%		1.2	16	12	49	13	45	10	2
School 18	8	3	33%		0.6	14	7	49	15	49	12	3
School 19	8	2	25%		2.2	16	10	48	14	47	10	3
School 20	17	3	18%		0.9	16	14	46	11	43	9	2
School 21	8	1	13%		1.2	15	11	48	12	47	9	2
School 22	9	1	11%		1.2	22	10	44	11	42	7	2
School 23	7	0	0%		0.7	19	9	51	10	41	7	2
School 24	9	0	0%		0.8	14	10	47	14	47	9	2
Total	262	110	42%		1.4	19	12	49	14	47	10	2

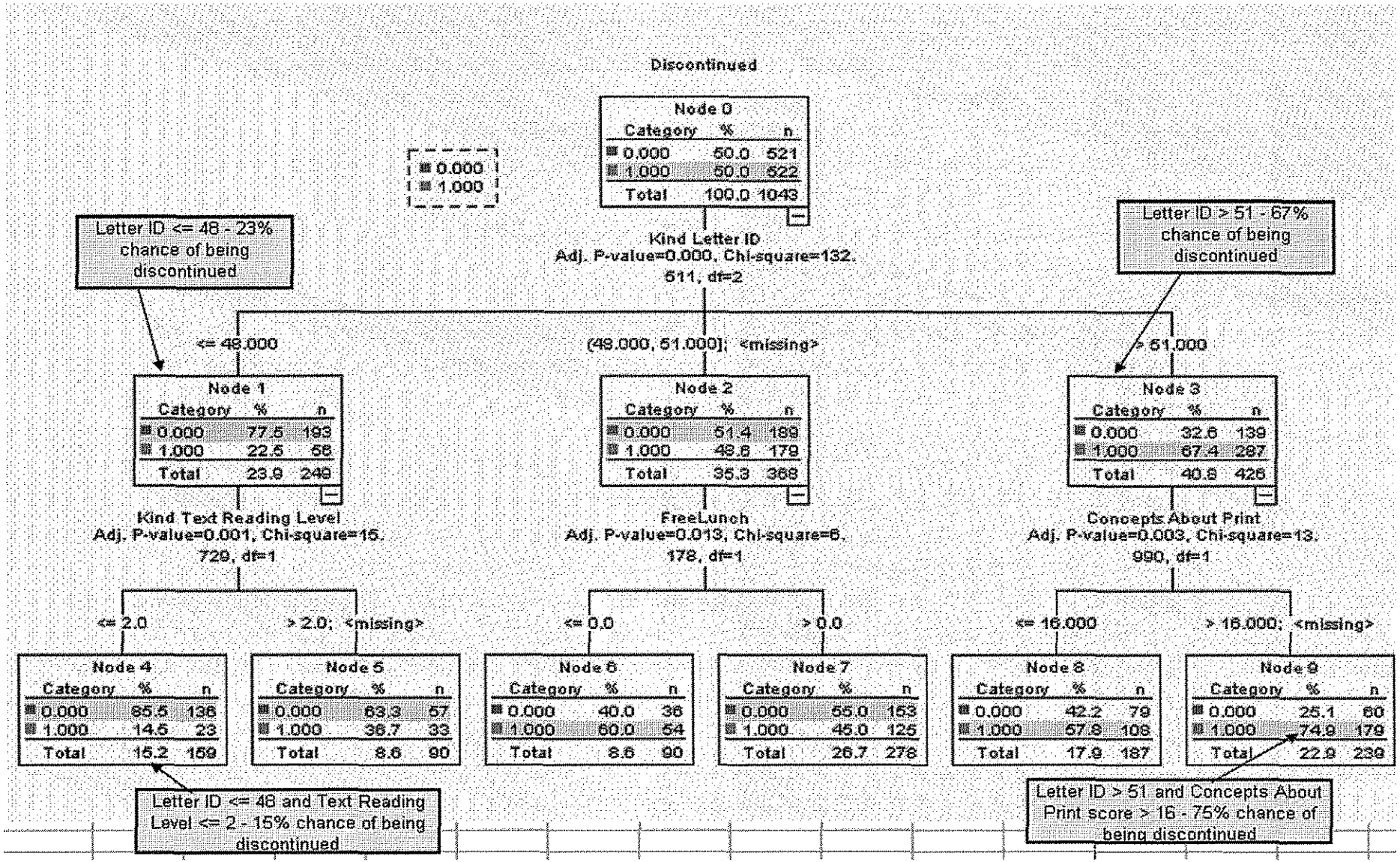
2008-09 Discontinuation Rates by School														
							Spring K Pre-Scores				*Spring Grade 1 Post Scores*			
Teacher	Year	% Discontinued	# Students Receiving RR	# Discontinued	% Discontinued	% Discontinued	Text Reading Level	Dictation	Concepts About Print	Kind Letter ID	Text Reading Level	Sounds	Spelling	Editing
1	2008	38%	8	3	38%		1.0	12	15	45	14	45	7	2
1	2009	50%	8	4	50%		1.2	18	13	48	15	50	12	2
2	2008	60%	5	3	60%		4.0	19	18	47	15	50	11	2
2	2009	80%	5	4	80%		2.3	22	18	50	16	53	13	2
3	2008	38%	8	3	38%		2.0	21	14	46	12	43	7	2
3	2009	38%	8	3	38%		0.9	19	12	50	14	48	9	3
4	2008	78%	9	7	78%		4.0	24	15	52	16	51	12	2
4	2009	63%	8	5	63%		1.8	23	16	52	15	49	11	2
5	2009	25%	8	2	25%		1.2	15	11	50	13	48	9	3
6	2008	50%	10	5	50%		3.0	18	14	47	14	47	3	2
6	2009	63%	8	5	63%		1.5	22	12	46	15	36	12	3
7	2008	13%	8	1	13%		2.0	12	12	41	10	45	9	2
8	2008	57%	7	4	57%		1.0	23	15	46	13	45	8	2
8	2009	38%	8	3	38%		1.0	19	13	48	13	44	8	2
9	2009	13%	8	1	13%		1.2	15	11	48	13	45	10	2
10	2008	20%	10	2	20%		3.0	25	16	49	12	43	9	2
11	2008	50%	8	4	50%		3.0	20	13	49	13	45	8	1
11	2009	50%	8	4	50%		3.3	24	16	51	15	50	11	3
12	2008	13%	8	1	13%		2.0	18	11	47	10	43	8	2
13	2008	60%	10	6	60%		3.0	19	15	50	15	49	10	2
13	2009	25%	8	2	25%		2.2	16	10	48	10	35	7	2
14	2009	22%	9	2	22%		1.0	18	15	46	10	44	8	2
15	2008	56%	9	5	56%		4.0	21	13	52	13	48	11	2
16	2008	40%	10	4	40%		4.0	27	16	53	11	47	10	2
16	2009	11%	9	1	11%		1.2	22	10	44	6	30	5	1
17	2008	44%	9	4	44%		4.0	19	17	50	14	48	10	2
17	2009	75%	8	6	75%		1.5	14	16	48	17	53	13	3
18	2009	13%	8	1	13%		0.9	15	13	46	13	41	8	2
19	2009	50%	8	4	50%		0.9	22	7	52	13	50	10	3
20	2009	50%	8	4	50%		2.0	17	14	51	10	33	7	2
21	2008	56%	9	5	56%		3.0	18	18	45	11	46	9	2
21	2009	38%	8	3	38%		1.6	18	16	50	12	41	8	2
22	2008	63%	8	5	63%		1.0	9	12	44	13	43	10	2
22	2009	38%	8	3	38%		0.6	14	7	49	11	42	7	2
23	2009	38%	8	3	38%		1.1	19	11	50	13	42	8	2
24	2008	60%	5	3	60%		4.0	25	15	53	14	48	11	2
24	2009	25%	4	1	25%		0.8	21	10	38	11	42	7	2
25	2008	75%	8	6	75%		4.0	24	17	51	14	48	11	3
25	2009	50%	8	4	50%		2.0	23	17	47	13	47	11	2
26	2008	50%	8	4	50%		3.0	18	18	43	12	48	9	3
27	2008	78%	9	7	78%		3.0	19	15	46	16	49	11	2
27	2009	80%	10	8	80%		1.8	26	17	50	17	44	10	2
28	2008	63%	8	5	63%		3.0	23	12	51	14	49	10	2
28	2009	50%	8	4	50%		1.5	23	12	51	12	43	9	2
29	2009	0%	7	0	0%		0.7	19	9	51	9	40	7	2
30	2008	50%	8	4	50%		2.0	21	15	46	14	53	12	3
30	2009	50%	8	4	50%		1.4	16	16	50	14	47	9	2
31	2008	50%	8	4	50%		2.0	14	12	45	12	41	9	2
31	2009	38%	8	3	38%		1.1	13	7	44	12	43	8	2
32	2008	63%	8	5	63%		3.0	19	15	47	12	48	10	2
32	2009	44%	9	4	44%		2.4	25	13	53	13	48	10	2
33	2008	67%	3	2	67%		4.0	18	20	45	16	50	10	1
33	2009	75%	4	3	75%		1.3	16	12	49	16	52	11	3
34	2008	75%	8	6	75%		3.0	23	15	52	14	48	11	3
34	2009	50%	8	4	50%		1.5	21	16	52	14	49	12	2
35	2008	75%	8	6	75%		2.0	18	14	44	17	44	12	3
35	2009	63%	8	5	63%		1.6	21	13	47	16	50	11	2
36	2008	56%	9	5	56%		3.0	18	13	51	16	52	11	2
36	2009	50%	4	2	50%		1.0	18	2	43	15	49	12	3
37	2008	38%	8	3	38%		3.0	16	14	33	14	48	11	3
37	2009	38%	8	3	38%		1.7	18	11	45	13	50	10	2
38	2008	63%	8	5	63%		2.0	11	13	31	15	42	10	2
38	2009	63%	8	5	63%		1.0	15	9	47	16	50	11	2
39	2008	0%	9	0	0%		3.0	15	16	31	8	42	7	2
39	2009	0%	9	0	0%		0.8	14	10	47	13	49	12	2
40	2008	38%	8	3	38%		3.0	17	15	44	9	31	7	0
Total	2008	50%	258	129	50%		1.4	19	12	48	13	45	9	2
Total	2009	42%	262	110	42%		3.0	19	15	46	13	46	10	2

3. Use of Predictive Models to Identify Students Who Would be Successful in Reading Recovery®

The District already uses a predictive model to identify students at-risk of not being proficient in reading at the end of 1st grade using the end of Kindergarten information. The model creates a probability for each student based mainly on the student's end of Kindergarten PLAA scores. Most students who receive Reading Recovery® are in this at-risk group. There are a few students placed in Reading Recovery® who seem to have a high probability of being proficient at the end of 1st grade – 5% in 2008-09.

Nationally, Reading Recovery® reports that approximately 60% of all students who receive Reading Recovery® are discontinued. Rates in Madison have been lower for the past 3 years. It may be possible to take the students Reading Recovery® has already identified as needing assistance and try to identify the students in that group who are most likely to discontinue from the program. To do this type of analysis, a decision tree procedure can be run using Reading Recovery® students from the past four years. The decision tree procedure creates a tree-based classification model. It classifies cases into groups or predicts values of a dependent (target) variable based on values of independent (predictor) variables. In other words, we can use the binary outcome - discontinued/not discontinued - and identify which variables best distinguish between the two using the selection data available that placed the student in Reading Recovery®. It would be best to have all students that Reading Recovery® identified (not just those placed) because the analysis assumes that students who weren't placed but were considered eligible would be somewhat similar in their characteristics.

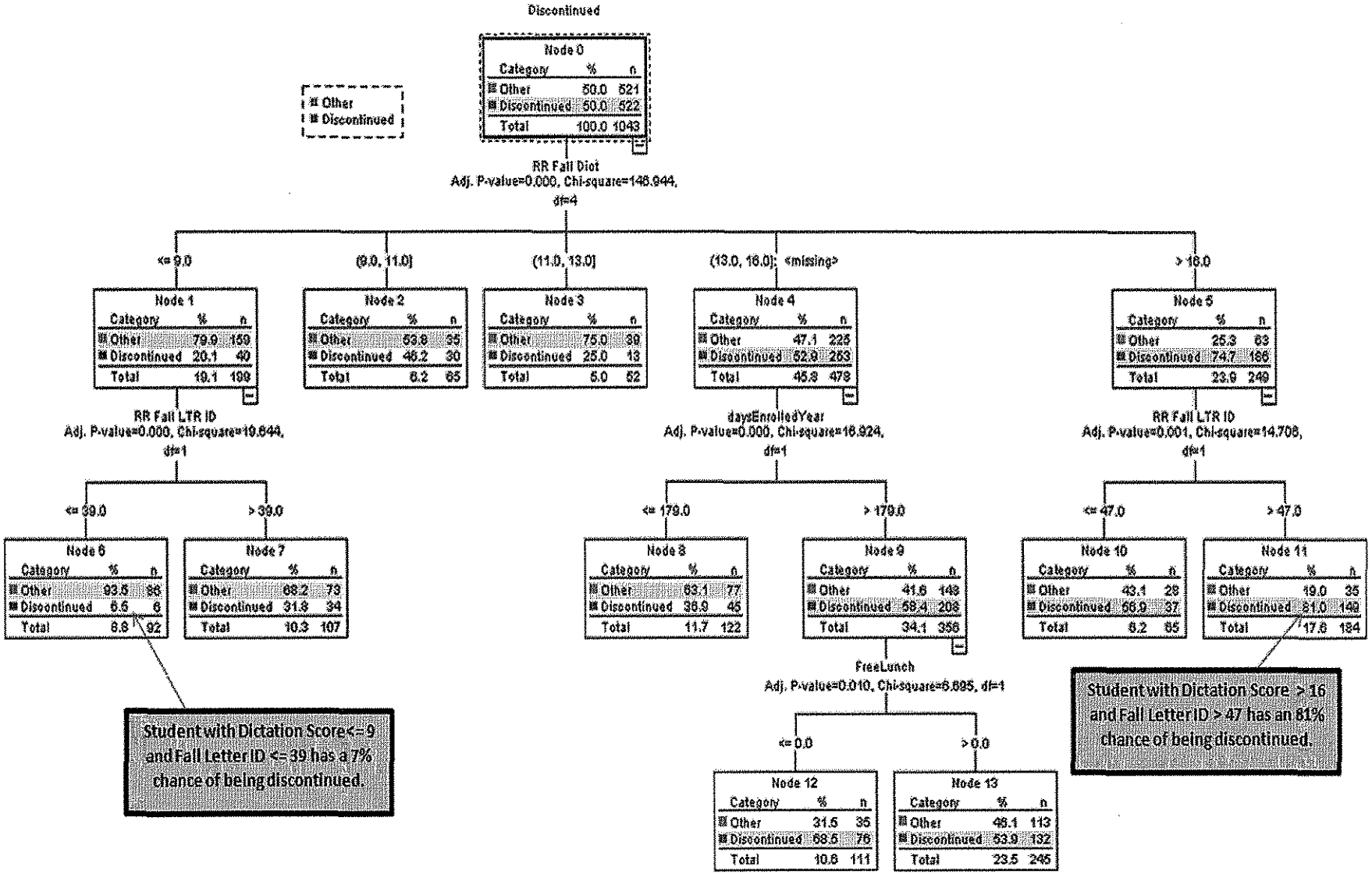
Using just the PLAA scores the following decision tree is produced.


Discontinued
0.000
1.000
Node 0
Category % n
0.000 50.0 521
1.000 50.0 522
Total 100.0 1043
Kind Letter ID
Adj. P-value=0.000, Chi-square=132.511, df=2
Letter ID <= 48 - 23% chance of being discontinued
Letter ID > 51 - 67% chance of being discontinued
<= 48.000
(48.000, 51.000]; <missing>
> 51.000
Node 1
Category % n
0.000 77.5 193
1.000 22.5 56
Total 23.9 249
Node 2
Category % n
0.000 51.4 189
1.000 48.6 179
Total 35.3 368
Node 3
Category % n
0.000 32.6 139
1.000 67.4 287
Total 40.8 426
Kind Text Reading Level
Adj. P-value=0.001, Chi-square=15.729, df=1
FreeLunch
Adj. P-value=0.013, Chi-square=6.178, df=1
Concepts About Print
Adj. P-value=0.003, Chi-square=13.990, df=1
<= 2.0
> 2.0; <missing>
<= 0.0
> 0.0
<= 16.000
> 16.000; <missing>
Node 4
Category % n
0.000 85.5 136
1.000 14.5 23
Total 15.2 159
Node 5
Category % n
0.000 63.3 57
1.000 36.7 33
Total 8.6 90
Node 6
Category % n
0.000 40.0 36
1.000 60.0 54
Total 8.6 90
Node 7
Category % n
0.000 55.0 153
1.000 45.0 125
Total 26.7 278
Node 8
Category % n
0.000 42.2 79
1.000 57.8 108
Total 17.9 187
Node 9
Category % n
0.000 25.1 60
1.000 74.9 179
Total 22.9 239
Letter ID <= 48 and Text Reading Level <= 2 - 15% chance of being discontinued
Letter ID > 51 and Concepts About Print score > 16 - 75% chance of being discontinued

This indicates that a student with an end of Kindergarten letter ID score higher than 51 and a Concepts About Print score of 17 or higher has a 75% chance of being discontinued. A student with a letter ID score less than 49 and a text reading level of two or less has a 15% chance of being discontinued. This analysis includes students from 2006-2009 who received Reading Recovery® so they already met the criteria for placement. A positive overall program effect is more likely when the discontinuation rate is 60% or above. If the percent of students receiving Reading Recovery® and being discontinued could be increased, the program would be more cost-effective. Discontinued students generally are proficient by the end of grade 1 and maintain proficiency to the end of grade 2 whereas other students remain behind their peers.

The same analysis can be run using only the scores that Reading Recovery® generates from the observation summary tests. The decision tree follows a similar pattern. In this analysis, performance on the dictation task makes the greatest difference followed by letter ID. A student with a dictation task score of 9 or less and a letter ID score less than 40 has a 7% probability of being discontinued. A student with a dictation task score higher than 16 and a letter ID score greater than 47 has an 81% probability of being discontinued.

Using these decision trees to select students who are in the lowest 20% for Reading Recovery would help increase discontinuation rates. To improve these models, it would be helpful to have all data collected on students considered for Reading Recovery®. This information may also be useful in terms of instruction. Perhaps Kindergarten and first grade teachers should provide focused instruction on letter identification and other literacy skills by providing instructions in varying formats, such as one-on-one or small groups prior to the Reading Recovery® . This would result in greater likelihood that students could become proficient after the Reading Recovery® intervention.


Discontinued
Other
Discontinued
Node 0
Category % n
Other 50.0 521
Discontinued 50.0 522
Total 100.0 1043
RR Fall Diot
Adj. P-value=0.000, Chi-square=146.944, df=4
<= 9.0
(9.0, 11.0]
(11.0, 13.0]
(13.0, 16.0]; <missing>
> 16.0
Node 1
Category % n
Other 79.9 159
Discontinued 20.1 40
Total 19.1 199
Node 2
Category % n
Other 53.8 35
Discontinued 46.2 30
Total 6.2 65
Node 3
Category % n
Other 75.0 39
Discontinued 25.0 13
Total 5.0 52
Node 4
Category % n
Other 47.1 225
Discontinued 52.9 253
Total 45.8 478
Node 5
Category % n
Other 25.3 63
Discontinued 74.7 186
Total 23.9 249
RR Fall LTR ID
Adj. P-value=0.000, Chi-square=19.644, df=1
daysEnrolledYear
Adj. P-value=0.000, Chi-square=16.924, df=1
RR Fall LTR ID
Adj. P-value=0.001, Chi-square=14.706, df=1
<= 39.0
> 39.0
<= 179.0
> 179.0
<= 47.0
> 47.0
Node 6
Category % n
Other 93.5 86
Discontinued 6.5 6
Total 8.8 92
Node 7
Category % n
Other 68.2 73
Discontinued 31.8 34
Total 10.3 107
Node 8
Category % n
Other 63.1 77
Discontinued 36.9 45
Total 11.7 122
Node 9
Category % n
Other 41.6 143
Discontinued 58.4 208
Total 34.1 356
Node 10
Category % n
Other 43.1 28
Discontinued 56.9 37
Total 6.2 65
Node 11
Category % n
Other 19.0 35
Discontinued 81.0 149
Total 17.6 184
FreeLunch
Adj. P-value=0.010, Chi-square=6.695, df=1
<= 0.0
> 0.0
Node 12
Category % n
Other 31.5 35
Discontinued 68.5 76
Total 10.6 111
Node 13
Category % n
Other 46.1 113
Discontinued 53.9 132
Total 23.5 245
Student with Dictation Score<=9 and Fall Letter ID <=39 has a 7% chance of being discontinued.
Student with Dictation Score > 16 and Fall Letter ID > 47 has an 81% chance of being discontinued.

4. Cost Analysis

Reading Recovery® Allocations: ($81,000 per 14 FTE= $1,134,000)

The following is a table of allocations distributed to the schools. Redistribution of these allocations to schools has not changed for over eight years. The schools highlighted in bold do not currently have a Reading Recovery® teacher because of the lack of trained teachers in the hiring pool (internal and external). These schools, however, are providing reading intervention for first grade students. In addition, Lapham was excluded from using the allocation for Reading Recovery® per BOE decision.

School	*Reading Recovery® Allocation*	*Low Income*
Glendale	0.5	83%
Lindbergh	0.5	76%
Emerson	0.5	75%
Allis	0.5	74%
Mendota	0.5	74%
Lincoln	0.0	72%
Hawthorne	0.5	70%
Sandburg	0.5	68%
Leopold	1.0	68%
Falk	0.5	68%
Schenk	0.5	66%
Midvale	1.0	65%
Lake View	0.5	64%
Nuestro Mundo	0.0	61%
Orchard Ridge	0.5	58%
Lowell	0.5	53%
Thoreau	0.5	52%
Huegel	0.5	46%
Gompers	**0.5**	**45%**
Muir	0.5	38%
Crestwood	0.5	38%
Shorewood	0.0	34%
Olson	0.5	34%
Elvehjem	0.5	32%
Marquette	0.0	30%
Lapham	**0.5**	**28%**
Kennedy	0.5	26%
Stephens	**0.5**	**26%**
Chavez	0.5	25%
Randall	0.0	25%
Van Hise	0.0	21%
Franklin	0.5	21%
TOTAL	14.0	49%

Additional Reading Recovery® Costs:

Reading Recovery® Teacher Leaders: (1.5 FTE= $121,500)
Extended employment to write reports for the National organization: $4,000
Required National Conference attendance: $3,800
Ohio State Organization Fee (data analysis): $2,500
UW Tuition Budget (currently no training class): $5,400

Total Reading Recovery® Cost: Approximately $ 1,271,200

RECOMMENDATIONS
Part III

It is advisable to examine how this program is operationally implemented in Madison and how this differs from other school districts. The District should investigate different modes of service delivery for incomplete students, other methods to address the needs of recommended students and focus Reading Recovery resources on students in the lowest 20% with a high likelihood of being discontinued.

The district should use the predictive analysis models described in the report to inform Kindergarten program changes, student selection and a more systematic way of implementing interventions across the primary grades.

It is recommended that Reading Recovery® teachers utilize the access they have to the student information system to record enrollment as well as observation summary data on all students eligible for Reading Recovery® and those who receive the intervention. This should also be tracked in the Student Intervention Monitoring System (SIMS) for reference by other staff involved with an individual student's literacy programming. This would allow the development of better predictive models that accurately identify students with a high likelihood of success in the Reading Recovery® program.

It would be helpful if the data used to select Reading Recovery® students were recorded in the student data system. Staff currently enters the data into the National Reading Recovery® data system. Reading Recovery® staff do not currently use the district's student information system although the system is available to them. Use of the system should be required for all Reading Recovery® teachers.

Kindergarten and first grade teachers should provide focused instruction on letter identification and other literacy skills by providing instructions in varying formats, such as one-on-one or small group prior to the Reading Recovery®. This would result in greater likelihood that students could become proficient after Reading Recovery® intervention.

The District should implement a comprehensive model of literacy instruction that supports our lowest achieving literacy learners across all grade levels (see Appendix).

- Implement formal and informal assessments to drive teacher instruction aligned with student needs.
- Develop a protocol based on assessments to determine whether individual instruction or small group instruction is most appropriate.
- Provide intensive and ongoing professional development around age-appropriate literacy assessment and instruction that accelerates student learning at all grade levels.
- Provide early interventions district wide, for teachers to use in Kindergarten literacy that focus on oral language development, phonemic awareness, concepts about print and phonological analogy embedded in high quality, engaging instruction (Tier II).
- Provide ongoing monitoring and support for students who have received Reading Recovery®.
- Continue investigation of small group interventions that support students from various demographic groups at various stages of literacy development across the elementary years and into middle school.

- Ensure availability of culturally relevant books and materials in the book rooms and across all grade levels.

APPENDICES

Appendix A: Criteria for Placement in Reading Recovery®
MMSD Reading Recovery® Program – From Reading Recovery® staff

Procedures for Choosing Students to be Assessed and Selected for Placement in a Reading Recovery® Intervention in MMSD

Students are eligible for Reading Recovery® services if they are in first grade and are assessed to be the lowest achieving students. Children are not excluded because of potential special education diagnosis, limited English proficiency (as long as they can understand the tasks on initial assessments), or high absence patterns.

The following procedures are used in each elementary building to identify students who should be assessed in order to be considered for selection in the program. The Reading Recovery® teacher meets with Kindergarten teachers at the end of the school year to identify those Kindergarten students who are the lowest achieving in literacy after a year of instruction. Classroom teachers come to the meeting with a list that ranks their students from most to least proficient in literacy learning. The majority of Kindergarten teachers are easily able to describe the learning behaviors of their lowest students to the Reading Recovery® teacher so that they have some background information as well as end of Kindergarten PLAA data on each of the low functioning students there is concern over. Although there is no set criteria for what defines an end of year Kindergartener who should be considered for Reading Recovery® assessment, these are generally students who stand out as having had ongoing learning problems throughout the year, reflected in lower scores on summative assessments. These are also usually students who have demonstrated far less independence in their learning than their peers, demanding a great deal of teacher attention throughout the year. Since the lowest functioning students in one classroom may be somewhat higher functioning than students in the classroom next door, the Reading Recovery® teacher uses the summative data (particularly the spring PLAA text reading level) and formative observations collected on each child to try and create a school wide ranking of the lowest achieving students to choose for testing in the fall.

During the first week of school in September, the Reading Recovery® teacher begins assessing first grade students, starting with the lowest functioning student on the school wide list. Each Reading Recovery® teacher takes the time to do a complete evaluation on 6-8 of the lowest functioning first graders. They also screen any new students during the first few days of schools that first grade teachers have identified as being of concern. Reading Recovery® teachers list results of this testing (Observation Survey tasks) on a Student Selection form and compare the students' performance on the literacy tasks both in terms of raw data and stanines. The Reading Recovery® teacher shares the assessment results with the principal and first grade teachers and selects the four lowest achieving students for service. These students make up the first round of the Reading Recovery® program. They begin their series of lessons during the second week of school.

When a first round student completes the program (in 16-20 weeks), a new student is selected to fill that teaching slot. First grade classroom teachers can provide formative observations and summative assessments on their lowest functioning students once the school year is underway. That information can assist a Reading Recovery® teacher in locating the lowest functioning student(s) in the building. Students who were assessed in the fall but who were not the lowest students may be reassessed at this time. All students are assessed using all six of the Observation Survey tasks. Again, the student with the lowest scores is the first selected to fill any open teaching slot.

Appendix B: Regression Analysis Results

Summary of Models Reading Recovery 2006-2009	Text Reading Levels				Weeks			
	2006	2007	2008	2009	2006	2007	2008	2009
All Included	-0.20	-1.18	-0.35	0.57	-1	-4	-1	2
Round 1	0.32	-0.90	0.35	1.67	1	-3	1	5
Round 2/3	*	-0.54	0.10	0.66		-2	0	2
Kind TRL Less than or Equal to 3	1.24	-0.02	0.90	1.85	4	0	3	6
Kind TRL Greater than 3	-1.88	-2.04	-2.18	-1.14	-6	-6	-7	-3
Red/bold = significant at .05 level								

Reading Recovery 2006	Typical Profile for Entering Reading Recovery	Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
(Constant)		-6.30	2.77		-2.28	0.02
Kind Text Reading Level	3.0	0.36	0.02	0.35	15.61	0.00
Kind Dictation Task	21.5	0.17	0.02	0.25	9.21	0.00
Kind Concepts About Print	15.9	0.14	0.04	0.09	3.53	0.00
Kind Letter ID	50.1	0.11	0.02	0.11	4.98	0.00
Free Lunch	0.7	-0.95	0.26	-0.08	-3.72	0.00
Par Educ Grad Prof	0.1	1.10	0.23	0.09	4.75	0.00
Gr 1 Spec Ed 3rd Fri	0.1	-1.19	0.31	-0.07	-3.84	0.00
Gr 1 Attendance Rate	94.2	0.07	0.03	0.05	2.78	0.01
Days Enrolled Grade 1 MMSD	174.6	0.02	0.01	0.04	2.33	0.02
Black	0.4	-0.62	0.27	-0.05	-2.29	0.02
Reading Recovery Lessons (quadratic)^	4178.1	0.00	0.00	-0.01	-0.75	0.45
Expected End of Grade 1 Text Reading Level - Reading Recovery						
Not Receiving Reading Recovery	14.89					
Receiving Reading Recovery	**14.69**					
Difference (Program Effect)	**-0.20**					

Reading Recovery 2007	Typical Profile for Entering Reading Recovery	Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
(Constant)		-2.32	2.64		-0.88	0.38
Kind Text Reading Level	2.9	0.42	0.02	0.41	20.31	0.00
Kind Dictation Task	17.6	0.18	0.02	0.28	11.41	0.00
Kind Letter ID	47.0	0.10	0.02	0.09	4.56	0.00
Free Lunch	0.6	-0.79	0.25	-0.06	-3.16	0.00
Par Educ Grad Prof	0.05	0.63	0.25	0.04	2.49	0.01
Gr 1 Spec Ed 3rd Fri	0.2	-2.54	0.48	-0.13	-5.24	0.00
Gr 1 Attendance Rate	93.9	0.04	0.02	0.03	1.82	0.07
Days Enrolled MMSD Gr 1	173.0	0.02	0.01	0.04	2.56	0.01
SE Asian	0.1	-1.72	0.53	-0.05	-3.24	0.00
Speech & Language	0.1	1.45	0.60	0.06	2.41	0.02
Two Adult Household	0.5	0.47	0.23	0.04	2.02	0.04
Reading Recovery Lessons (quadratic)^	4267.5	0.00	0.00	-0.07	-3.94	**0.00**
Expected End of Grade 1 Text Reading Level - Reading Recovery						
Not Receiving Reading Recovery	13.24					
Receiving Reading Recovery	**12.06**					
Difference (Program Effect)	**-1.18**					

Reading Recovery 2008	Typical Profile for Entering Reading Recovery	Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
(Constant)		9.54	3.44		2.77	0.01
Kind Text Reading Level	2.7	0.44	0.02	0.38	19.78	0.00
Kind Dictation Task	18.5	0.20	0.02	0.28	13.10	0.00
Kind Concepts About Print	14.9	0.04	0.02	0.03	2.02	0.04
Kind Composite Access Score	5.4	0.74	0.11	0.23	6.87	0.00
Gr 1 Spec Ed 3rd Fri	0.2	-2.33	0.39	-0.11	-6.01	0.00
Gr 1 Attendance Rate	93.0	0.10	0.03	0.07	3.55	0.00
Black	0.4	-0.74	0.32	-0.05	-2.36	0.02
ELL 3rd Fri Sept	0.3	2.41	0.55	0.14	4.41	0.00
Free Lunch	0.8	-2.08	0.30	-0.15	-6.99	0.00
Reduced Price Lunch	0.1	-1.36	0.43	-0.05	-3.14	0.00
# of Schools Kind/Gr 1 Mobility	1.1	-1.48	0.49	-0.05	-3.02	0.00
Kind Attendance Rate	92.7	-0.08	0.03	-0.06	-2.81	0.01
ED	0.0	-2.68	1.19	-0.04	-2.25	0.02
Age	5.9	-0.72	0.35	-0.03	-2.07	0.04
Reading Recovery Lessons (quadratic)^	4066.6	0.00	0.00	-0.02	-1.07	0.29
Expected End of Grade 1 Text Reading Level - Reading Recovery						
Not Receiving Reading Recovery	13.53					
Receiving Reading Recovery	**13.18**					
Difference (Program Effect)	**-0.35**					

Reading Recovery 2009	Typical Profile for Entering Reading Recovery	Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
(Constant)		-3.27	2.05		-1.60	0.11
Kind Text Reading Level	1.5	0.44	0.02	0.46	22.28	0.00
Kind Dictation Task	18.9	0.15	0.02	0.19	7.43	0.00
Kind Concepts About Print	12.5	0.10	0.03	0.07	3.52	0.00
Kind Letter ID	48.8	0.18	0.03	0.12	6.14	0.00
Free Lunch	0.8	-0.98	0.28	-0.07	-3.48	0.00
Par Educ Grad Prof	0.04	1.03	0.35	0.05	2.97	0.00
Gr 1 Spec Ed 3rd Fri	0.2	-2.88	0.49	-0.14	-5.88	0.00
Days Enrolled Grade 1	172.7	0.02	0.01	0.04	2.33	0.02
Black	0.5	-1.10	0.32	-0.07	-3.47	0.00
SL	0.2	1.40	0.63	0.05	2.22	0.03
Kind Composite Access Score	5.8	0.20	0.07	0.05	2.84	0.00
Par Educ No Info	0.4	0.51	0.23	0.04	2.20	0.03
Reading Recovery Lessons (quadratic)^	4228.4	0.00	0.00	0.03	1.67	0.10
Expected End of Grade 1 Text Reading Level - Reading Recovery						
Not Receiving Reading Recovery	11.67					
Receiving Reading Recovery	**12.24**					
Difference (Program Effect)	**0.57**					

Reading Recovery 2006 Round 1 Only	Typical Profile for Entering Reading Recovery Round 1	Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
(Constant)		-3.36	2.81		-1.19	0.23
Kind Text Reading Level	2.7	0.35	0.02	0.35	15.35	0.00
Kind Dictation Task	19.9	0.19	0.02	0.29	10.43	0.00
Kind Concepts About Print	15.4	0.16	0.04	0.11	4.07	0.00
Kind Letter ID	49.5	0.11	0.02	0.10	4.46	0.00
Gr 1 Spec Ed 3rd Fri	0.1	-1.02	0.32	-0.06	-3.19	0.00
Par Educ Grad Prof	0.1	1.15	0.23	0.09	5.08	0.00
Par Educ HS Diploma	0.3	-1.11	0.31	-0.07	-3.60	0.00
Number of Schools Kind/Grade 1 Mobility	1.0	-1.52	0.57	-0.05	-2.67	0.01
Kind/Gr 1 Susp	0.1	-1.00	0.39	-0.05	-2.56	0.01
Gr 1 Att Rate	94.1	0.08	0.03	0.06	2.99	0.00
Reading Recovery Lessons (quadratic)*	5130.4	0.00	0.00	0.02	0.87	0.38
Expected End of Grade 1 Text Reading Level - Reading Recovery						
Not Receiving Reading Recovery	14.44					
Receiving Reading Recovery	**14.75**					
Difference (Program Effect)	**0.32**					

Reading Recovery 2007 Round 1 Only	Typical Profile for Entering Reading Recovery Round 1	Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
(Constant)		-2.66	1.88		-1.41	0.16
Kind Text Reading Level	2.6	0.40	0.02	0.40	19.48	0.00
Kind Dictation Task	17.1	0.19	0.02	0.28	11.36	0.00
Kind Letter ID	47.1	0.14	0.03	0.11	5.08	0.00
Gr 1 Spec Ed 3rd Fri	0.2	-2.39	0.50	-0.13	-4.74	0.00
Par Educ Grad Prof	0.03	0.59	0.25	0.04	2.33	0.02
SEAsian	0.1	-1.39	0.59	-0.04	-2.35	0.02
Two Adult Household	0.5	0.64	0.23	0.05	2.74	0.01
daysEnrolledYear	171.3	0.02	0.01	0.05	3.14	0.00
SL	0.1	1.22	0.63	0.05	1.95	0.05
Kind Composite Access Score	5.6	0.20	0.06	0.06	3.31	0.00
Black	0.5	-0.88	0.27	-0.06	-3.22	0.00
QuadraticTreatment	5222.7	0.00	0.00	-0.04	-2.24	**0.03**
Expected End of Grade 1 Text Reading Level - Reading Recovery						
Not Receiving Reading Recovery	12.23					
Receiving Reading Recovery	**11.33**					
Difference (Program Effect)	**-0.90**					

Reading Recovery 2008 Round 1 Only	Typical Profile for Entering Reading Recovery Round 1	Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
(Constant)		1.90	2.55		0.74	0.46
Kind Text Reading Level	2.3	0.44	0.02	0.38	19.12	0.00
Kind Dictation Task	16.8	0.22	0.02	0.29	13.35	0.00
Kind Concepts About Print	13.9	0.05	0.02	0.04	2.34	0.02
Free Lunch	0.8	-1.69	0.31	-0.14	-5.11	0.00
Gr 1 Spec Ed 3rd Fri	0.2	-2.33	0.41	-0.10	-5.64	0.00
Number of Schools Kind/Grade 1 Mobility	1.1	-1.75	0.58	-0.05	-3.04	0.00
Gr 1 Att Rate	93.6	0.05	0.02	0.04	2.07	0.04
Kind Composite Access Score	5.4	0.79	0.11	0.25	7.03	0.00
Black	0.5	-0.81	0.33	-0.05	-2.46	0.01
ELL 3rd Friday Sept (1=Y,0=N)	0.3	2.57	0.56	0.15	4.54	0.00
ReducedLunch	0.1	-1.26	0.44	-0.05	-2.84	0.00
Reading Recovery Lessons (quadratic)*	4912.1	0.00	0.00	0.01	0.76	0.44
Expected End of Grade 1 Text Reading Level - Reading Recovery						
Not Receiving Reading Recovery	12.55					
Receiving Reading Recovery	**12.90**					
Difference (Program Effect)	**0.35**					

Reading Recovery 2009 Round 1 Only	Typical Profile for Entering Reading Recovery Round 1	Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
(Constant)		0.05	1.44		0.04	0.97
Kind Text Reading Level	1.1	0.43	0.02	0.46	21.61	0.00
Kind Dictation Task	16.8	0.17	0.02	0.21	7.97	0.00
Kind Concepts About Print	11.2	0.11	0.03	0.08	3.63	0.00
Kind Letter ID	47.2	0.19	0.03	0.13	6.39	0.00
Free Lunch	0.7	-0.92	0.29	-0.07	-3.23	0.00
Par Educ Grad Prof	0.1	1.04	0.36	0.06	2.96	0.00
Gr 1 Spec Ed 3rd Fri	0.3	-2.75	0.50	-0.13	-5.49	0.00
SL	0.2	1.50	0.66	0.05	2.26	0.02
Black	0.5	-1.10	0.33	-0.07	-3.38	0.00
ELL 3rd Friday Sept (1=Y,0=N)	0.2	-0.95	0.34	-0.05	-2.84	0.00
Par Educ No Info	0.5	0.47	0.24	0.04	1.97	0.05
Reading Recovery Lessons (quadratic)*	5077.0	0.00	0.00	0.07	3.63	**0.00**
Expected End of Grade 1 Text Reading Level - Reading Recovery						
Not Receiving Reading Recovery	11.69					
Receiving Reading Recovery	**13.36**					
Difference (Program Effect)	**1.67**					

Reading Recovery lessons is included are the model as a nonlinear relationship.
The relationship between the number of lessons a child receives and their reading level is not a linear relationship.
For example, students who are struggling , may require more lessons. This can be adjusted for
by squaring the lessons.

Reading Recovery 2007 Round 2/3 Only Using Gr 1 Qtr 2 TRL	Typical Profile for Entering Reading Recovery Round 2/3	Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
(Constant)		5.06	1.69		2.99	0.00
Gr 1 Term 2 TRL	4.6	0.64	0.01	0.76	60.68	0.00
Black	0.4	-0.59	0.23	-0.04	-2.55	0.01
Hispanic	0.2	-1.16	0.24	-0.07	-4.76	0.00
Southeast Asian	0.1	-2.42	0.41	-0.08	-5.98	0.00
Par Educ Grad Prof	0.1	0.41	0.20	0.03	2.09	0.04
Gr 1 Suspensions	0.1	-0.96	0.39	-0.03	-2.45	0.01
Gr 1 Attendance Rate	93.9	0.06	0.02	0.05	3.48	0.00
Free Lunch	0.7	-0.39	0.20	-0.03	-1.89	0.06
Reading Recovery Lessons (quadratic)*	3138.1	0.00	0.00	-0.03	-1.92	**0.05**
Expected End of Grade 1 Text Reading Level - Reading Recovery						
Not Receiving Reading Recovery	12.82					
Receiving Reading Recovery	**13.28**					
Difference (Program Effect)	**0.54**					

Reading Recovery 2008 Round 2/3 Only	Typical Profile for Entering Reading Recovery Round 2/3	Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
(Constant)		11.28	0.21		52.77	0.00
Gr 1 Term 2 TRL	5.0	0.71	0.01	0.80	61.16	0.00
Free Lunch	0.8	-1.03	0.19	-0.08	-5.34	0.00
Black	0.4	-0.80	0.21	-0.05	-3.87	0.00
Gr 1 Spec Ed 3rd Fri	0.1	-1.73	0.28	-0.06	-6.17	0.00
ELL3rdFri	0.3	-0.89	0.21	-0.06	-4.31	0.00
OHI	0.01	-2.78	0.86	-0.04	-3.17	0.00
Par Educ LT HS	0.1	-0.74	0.34	-0.03	-2.16	0.03
Reduced Price Lunch	0.04	-0.63	0.29	-0.03	-2.18	0.03
Reading Recovery Lessons (quadratic)*	3316.0	0.00	0.00	0.00	0.37	0.71
Expected End of Grade 1 Text Reading Level - Reading Recovery						
Not Receiving Reading Recovery	13.09					
Receiving Reading Recovery	**13.19**					
Difference (Program Effect)	**0.10**					

Reading Recovery 2009 Round 2/3 Only	Typical Profile for Entering Reading Recovery Round 2/3	Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
(Constant)		5.75	1.64		3.51	0.00
Gr 1 Term 2 TRL	4.5	0.75	0.01	0.87	70.31	0.00
Free Lunch	0.8	-0.70	0.16	-0.05	-4.48	0.00
Gr 1 Spec Ed 3rd Fri	0.2	-1.92	0.33	-0.09	-5.78	0.00
Gr 1 Attendance Rate	92.3	0.04	0.02	0.03	2.60	0.01
SL	0.1	1.27	0.45	0.04	2.80	0.01
Reading Recovery Lessons (quadratic)*	3235.4	0.00	0.00	0.03	2.59	**0.01**
Expected End of Grade 1 Text Reading Level - Reading Recovery						
Not Receiving Reading Recovery	12.48					
Receiving Reading Recovery	**13.14**					
Difference (Program Effect)	**0.66**					

Reading Recovery 2006 Round 2/3 Only*	Typical Profile for Entering Reading Recovery Round 2/3	Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
(Constant)		-2.82	2.69		-1.05	0.30
Kind Text Reading Level	3.4	0.34	0.02	0.35	15.13	0.00
Kind Dictation Task	23.6	0.19	0.02	0.26	9.64	0.00
Kind Concepts About Print	16.4	0.13	0.04	0.08	3.33	0.00
Kind Letter ID	50.7	0.10	0.02	0.10	4.42	0.00
Free Lunch	0.6	-0.87	0.27	-0.07	-3.24	0.00
Par Educ Grad Prof	0.0	0.90	0.23	0.07	3.86	0.00
Par Educ HS Diploma	0.3	-0.85	0.31	-0.05	-2.69	0.01
Gr 1 Spec Ed 3rd Fri	0.1	-1.30	0.32	-0.08	-4.04	0.00
Black	0.4	-0.72	0.28	-0.05	-2.54	0.01
Gr 1 Attendance Rate	94.3	0.07	0.03	0.05	2.64	0.01
Reading Recovery Lessons (quadratic)*	3115.7	0.00	0.00	-0.07	-3.69	**0.00**
Expected End of Grade 1 Text Reading Level - Reading Recovery						
Not Receiving Reading Recovery	15.56					
Receiving Reading Recovery	**14.32**					
Difference (Program Effect)	**-1.24**					

* No grades in 2006, used end of Kindergarten PLAA

Reading Recovery lessons have a non-linear relationship to the outcome variable.

The relationship between the number of lessons a child receives and their reading level is not a linear relationship.

For example, students who are struggling , may require more lessons. This can be adjusted for

by squaring the lessons. So the lessons are a square of the lessons received (e.g. 60 lessons = 3600).

Reading Recovery 2006 Using Only Students with Text Reading Level End of K Less than or Equal to 3	Typical Profile for Entering Reading Recovery	Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
(Constant)		14.36	4.90		2.93	0.00
Dictation	19.1	0.13	0.04	0.22	3.77	0.00
Kind Letter ID	49.2	0.12	0.03	0.19	3.55	0.00
Gr 1 Spec Ed 3rd Fri	0.1	-1.77	0.60	-0.14	-2.94	0.00
Par Educ Grad Prof	0.0	2.31	0.78	0.14	2.97	0.00
NewAge	5.9	-2.12	0.79	-0.12	-2.70	0.01
Concepts About Print	15.2	0.21	0.06	0.15	2.60	0.01
Par Educ LT HS	0.1	2.66	1.00	0.12	2.66	0.01
FreeLunch	0.7	-1.15	0.54	-0.10	-2.12	0.03
Reading Recovery Lessons (quadratic)*	4317.0	0.00	0.00	0.13	2.81	0.01
Expected End of Grade 1 Text Reading Level - Reading Recovery						
Not Receiving Reading Recovery	12.88					
Receiving Reading Recovery	**14.12**					
Difference (Program Effect)	**1.24**					

Reading Recovery 2007 Using Only Students with Text Reading Level End of K Less than or Equal to 3	Typical Profile for Entering Reading Recovery	Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
(Constant)		-0.62	2.48		-0.25	0.80
Dictation	16.9	0.24	0.03	0.41	7.44	0.00
Gr 1 Spec Ed 3rd Fri	0.2	0.06	0.03	0.09	1.77	0.08
AsianNotSE	0.0	0.85	0.30	0.14	2.79	0.01
Kind Text Reading Level	2.3	3.83	1.24	0.13	3.10	0.00
daysEnrolledYear	171.7					
SL	0.1					
Reading Recovery Lessons (quadratic)*	4510.6	0.00	0.00	0.00	-0.04	0.97
Expected End of Grade 1 Text Reading Level - Reading Recovery						
Not Receiving Reading Recovery	12.06					
Receiving Reading Recovery	**12.04**					
Difference (Program Effect)	**-0.02**					

Reading Recovery 2008 Using Only Students with Text Reading Level End of K Less than or Equal to 3	Typical Profile for Entering Reading Recovery	Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
(Constant)		8.21	1.07		7.70	0.00
Dictation	16.3	0.23	0.02	0.40	9.46	0.00
Concepts About Print	14.0	0.16	0.05	0.11	2.77	0.01
Gr 1 Spec Ed 3rd Fri	0.2	-3.49	0.58	-0.24	-6.01	0.00
FreeLunch	0.6	-2.37	0.47	-0.19	-5.06	0.00
AUT	0.0	7.38	2.75	0.10	2.68	0.01
Reading Recovery Lessons (quadratic)*	4130.4	0.00	0.00	0.08	2.03	0.04
Expected End of Grade 1 Text Reading Level - Reading Recovery						
Not Receiving Reading Recovery	11.69					
Receiving Reading Recovery	**12.59**					
Difference (Program Effect)	**0.90**					

Reading Recovery 2009 Using Only Students with Text Reading Level End of K Less than or Equal to 2	Typical Profile for Entering Reading Recovery	Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
(Constant)		16.23	4.44		3.65	0.00
Kind Letter ID	47.9	0.17	0.03	0.27	5.23	0.00
Gr 1 Spec Ed 3rd Fri	0.3	-2.17	0.55	-0.19	-3.94	0.00
Kind Text Reading Level	1.0	1.33	0.42	0.17	3.16	0.00
NewAge	6.0	-2.51	0.70	-0.16	-3.61	0.00
FreeLunch	0.8	-1.32	0.48	-0.12	-2.76	0.01
Concepts About Print	11.3	0.11	0.04	0.13	2.73	0.01
AsianNotSE	0.0	2.79	1.14	0.11	2.45	0.01
Dictation	17.4	0.07	0.03	0.12	2.26	0.02
Reading Recovery Lessons (quadratic)*	4368.9	0.00	0.00	0.20	4.38	0.00
Expected End of Grade 1 Text Reading Level - Reading Recovery						
Not Receiving Reading Recovery	11.36					
Receiving Reading Recovery	**13.21**					
Difference (Program Effect)	**1.85**					

Reading Recovery 2006 Using Only Students with Text Reading Level End of K Greater than 3 and Less Than 8	Typical Profile for Entering Reading Recovery	Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
(Constant)		6.40	3.46		1.85	0.07
Dictation	29.4	0.14	0.03	0.20	4.55	0.00
FreeLunch	0.6	-1.24	0.30	-0.16	-4.17	0.00
Kind Text Reading Level	5.2	0.64	0.15	0.16	4.22	0.00
Par Educ Grad Prof	0.1	1.10	0.32	0.13	3.47	0.00
Number of Schools Kind/Grade 1 Mobility	1.1	-2.27	0.71	-0.12	-3.21	0.00
Days Enr Kind MMSD	171.3	-0.01	0.01	-0.09	-2.41	0.02
Kind Letter ID	53.0	0.08	0.04	0.09	2.26	0.02
NewAge	6.0	0.89	0.44	0.07	2.01	0.04
Reading Recovery Lessons (quadratic)"	3736.1	0.00	0.00	-0.16	-4.34	**0.00**
Expected End of Grade 1 Text Reading Level - Reading Recovery						
Not Receiving Reading Recovery	18.14					
Receiving Reading Recovery	**16.26**					
Difference (Program Effect)	**-1.88**					

Reading Recovery 2007 Using Only Students with Text Reading Level End of K Greater than 3 and Less than 8	Typical Profile for Entering Reading Recovery	Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
(Constant)		9.35	1.44		6.50	0.00
Dictation	25.0	0.14	0.03	0.19	5.02	0.00
Kind Text Reading Level	5.2	0.94	0.16	0.22	5.77	0.00
Par Educ Grad Prof	0.1	1.49	0.40	0.15	3.75	0.00
Number of Schools Kind/Grade 1 Mobility	1.1	-2.00	0.87	-0.08	-2.31	0.02
Black	0.3	-1.64	0.35	-0.17	-4.74	0.00
KindELLScore	5.87	0.26	0.08	0.12	3.33	0.00
Par Educ No Info	0.3	0.77	0.31	0.09	2.45	0.01
Reading Recovery Lessons (quadratic)"	3339.9	0.00	0.00	-0.14	-3.84	0.00
Expected End of Grade 1 Text Reading Level - Reading Recovery						
Not Receiving Reading Recovery	17.42					
Receiving Reading Recovery	**15.38**					
Difference (Program Effect)	**-2.04**					

Reading Recovery 2008 Using Only Students with Text Reading Level End of K Greater than 3 and Less than 8	Typical Profile for Entering Reading Recovery	Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
(Constant)		17.65	3.50		5.04	0.00
Dictation	26.9	0.08	0.03	0.10	2.74	0.01
Kind Text Reading Level	5.1	1.15	0.17	0.25	6.77	0.00
Par Educ Grad Prof	0.0	0.87	0.40	0.08	2.17	0.03
Number of Schools Kind/Grade 1 Mobility	1.1	-2.54	0.86	-0.10	-2.95	0.00
NewAge	5.9	-1.30	0.53	-0.08	-2.47	0.01
Black	0.4	-1.30	0.39	-0.12	-3.35	0.00
KindELLScore	5.7	0.45	0.08	0.21	5.67	0.00
Reading Recovery Lessons (quadratic)"	3823.7	0.00	0.00	-0.13	-3.75	**0.00**
Expected End of Grade 1 Text Reading Level - Reading Recovery						
Not Receiving Reading Recovery	17.32					
Receiving Reading Recovery	**15.14**					
Difference (Program Effect)	**-2.18**					

Reading Recovery 2009 Text Reading Level Greater than 2 and Less than 6	Typical Profile for Entering Reading Recovery	Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
(Constant)		-18.28	11.19		-1.63	0.10
Dictation	25.6	0.16	0.04	0.19	3.88	0.00
Kind Letter ID	52.6	0.61	0.18	0.16	3.44	0.00
Par Educ Voc Tech	0.2	-2.03	0.64	-0.15	-3.17	0.00
daysEnrolledYear	171.7	0.05	0.02	0.12	2.70	0.01
Gr 1 Spec Ed 3rd Fri	0.2	-1.58	0.64	-0.12	-2.48	0.01
NewAge	6.0	-1.41	0.69	-0.09	-2.04	0.04
Black	0.6	-1.61	0.48	-0.17	-3.36	0.00
ELL3rdFri	0.10	-1.78	0.57	-0.15	-3.11	0.00
ReducedLunch	0.03	1.71	0.81	0.10	2.10	0.04
Reading Recovery Lessons (quadratic)"	3634.6	0.00	0.00	-0.08	-1.61	0.11
Expected End of Grade 1 Text Reading Level - Reading Recovery						
Not Receiving Reading Recovery	15.72					
Receiving Reading Recovery	**14.58**					
Difference (Program Effect)	**-1.14**					

Reading Recovery lessons is included are the model as a nonlinear relationship.
The relationship between the number of lessons a child receives and their reading level is not a linear relationship.
For example, students who are struggling , may require more lessons. This can be adjusted for
by squaring the lessons.

Appendix C: Changes in Students' Text Reading Levels

The following table shows, by year, the various changes in students' text reading levels. Not all data is available in every year. It also includes how students performed on the WKCE Third grade Reading Test (only available for the 2006 and 2007 cohorts). Shaded cells are those where students, on average, were proficient.

RR Outcome	Year	Kind Text Reading Level	Gr 1 Term 2 TRL	Gr 1 Term 3 TRL	Gr 1 Spr Text Rdg Level Prof = 16	Gr 2 Term 2 TRL	Gr 2 Term 3 TRL	Gr 2 Spring TRL Prof = 22	Prof+Adv WKCE Grade 3 Reading
Discontinued	2006	3			17	19	20	21	53%
Discontinued	2007	3	7	11	16	17	19	21	43%
Discontinued	2008	3	8	12	16	18	20	22	
Discontinued	2009	2	8	12	16				
Discontinued	Total	3	8	12	16	18	20	21	49%
Recommended	2006	2	.	.	11	15	17	19	16%
Recommended	2007	2	5	8	10	12	15	17	8%
Recommended	2008	2	6	8	10	12	15	18	
Recommended	2009	1	6	8	11				
Recommended	Total	2	6	8	11	13	16	18	12%
Incomplete	2006	3	.	.	9	13	15	17	19%
Incomplete	2007	3	4	5	9	12	14	16	15%
Incomplete	2008	3	3	6	10	12	14	16	
Incomplete	2009	1	3	6	11				
Incomplete	Total	3	3	6	10	12	14	16	17%
Other	2006	2	.	.	6	11	15	16	0%
Other	2007	3	5	7	8	11	13	15	10%
Other	2008	3	4	5	6	10	14	18	
Other	2009	1	4	5	7				
Other	Total	2	4	6	7	11	14	16	7%
Total Reading Rec	2006	3	.	.	14	17	19	20	40%
Total Reading Rec	2007	3	6	9	12	14	17	19	25%
Total Reading Rec	2008	3	6	10	13	15	18	20	
Total Reading Rec	2009	1	6	10	13				
Total Reading Rec	Total	3	6	9	13	16	18	20	33%
All Other Students	2006	8			20	22	23	24	80%
All Other Students	2007	8	14	16	19	22	23	25	78%
All Other Students	2008	8	14	17	20	23	24	26	
All Other Students	2009	8	14	17	20				
All Other Students	Total	8	14	17	20	22	24	25	79%

Appendix D: Comparison of Cases Included and Excluded in Analysis - Regression

Missing Cases 2005-06 School Year (20% of RR students excluded)						
	RR Included in Regression		RR Excluded from Regression		Difference Between	
Group	N	Mean	N	Mean	Include/Exclud	Significant?
Demographics						
FreeLunch	**226**	**66%**	**57**	**81%**	-15%	**Yes**
ReducedLunch	226	7%	57	4%	3%	No
ELL3rdFri	226	19%	57	19%	0%	Yes
Gr 1 Spec Ed 3rd Fri	226	14%	57	18%	-4%	No
LD	226	0%	57	0%	0%	No
AUT	226	0%	57	0%	0%	No
ED	226	0%	57	0%	0%	No
SL	226	7%	57	4%	3%	No
CD	226	0%	57	0%	0%	No
OHI	226	1%	57	0%	1%	No
Male	226	51%	57	53%	-2%	No
NatAmer	226	2%	57	4%	-2%	No
Black	226	42%	57	53%	-11%	No
Hispanic	226	16%	57	18%	-2%	No
Asian, Not Southeast Asian	**226**	**3%**	**57**	**0%**	**3%**	**Yes**
Southeast Asian	226	7%	57	5%	2%	No
White	226	30%	57	21%	9%	No
Two Adult Household	**226**	**53%**	**57**	**37%**	**16%**	**Yes**
Par Educ HS Diploma	226	27%	57	18%	9%	No
Par Educ Voc Tech	226	24%	57	23%	1%	No
Par Educ LT HS	226	10%	57	9%	1%	No
Par Educ Coll Deg	226	12%	57	9%	3%	No
Par Educ Grad Prof	226	5%	57	4%	1%	No
Par Educ No Info	**226**	**22%**	**57**	**39%**	**-17%**	**Yes**
Pre Test Scores						
RR Fall LTR ID	142	45.7	25	44.56	1	No
RRFallWord	142	2.0	25	1.20	1	No
RR Fall Cap	142	12.7	25	10.84	2	No
RR Fall Writ Voc	142	8.3	25	6.32	2	No
RR Fall Dict	142	16.9	25	12.36	4	No
RR Fall TRL	142	.8	25	.48	0	No
Gain Fall to Spr Letter ID	142	7.5	25	8.48	-1.0	No
Gain Fall to Spr Word	142	15.9	25	15.56	0.3	No
Gain Fall to Spr CAP	142	7.7	25	9.44	-1.7	No
Gain Fall to Spr Writ Voc	142	38.1	25	38.74	-0.6	No
Gain Fall to Spr Dictation	142	17.9	25	21.88	-4.0	No
Gain Fall to Spr TRL	142	14.8	25	13.56	1.2	No
Other Measures						
Gr 1 Att Rate	226	94.2	57	92.2	2.0	No
Days Enroll MMSD Gr 1	**226**	**174**	**57**	**151**	23.0	**Yes**
Kind Att Rate	225	93.4	13	86.6	6.8	No
Reading Recovery Outcomes						
Recommended	**226**	**20%**	**57**	**14%**	**6%**	**Yes**
Incomplete	226	12%	57	26%	-14%	No
Discontinued	**226**	**65%**	**57**	**49%**	**16%**	**Yes**

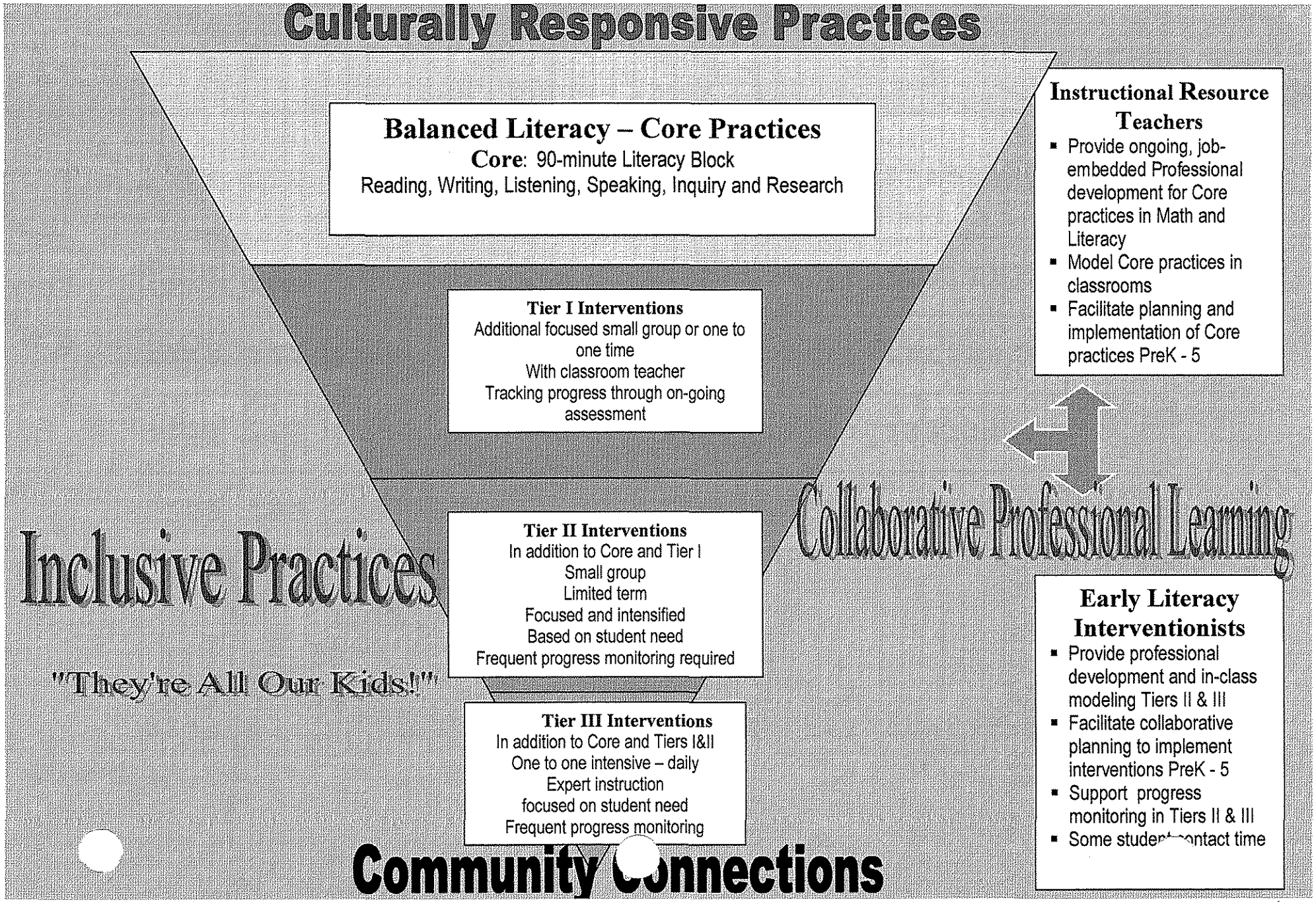
Missing Cases 2006-07 School Year 24% of Reading Recovery students excluded						
	RR Included in Regression		RR Excluded from Regression		Difference Between	
Group	N	Mean	N	Mean	Include/Exclud	Significant?
Demographics						
FreeLunch	196	78%	63	79%	-1%	No
ReducedLunch	196	4%	63	5%	-1%	No
ELL3rdFri	196	24%	63	27%	-3%	Yes
Gr 1 Spec Ed 3rd Fri	**196**	**18%**	**63**	**10%**	**8%**	**Yes**
LD	196	0%	63	0%	0%	No
AUT	196	0%	63	0%	0%	No
ED	196	2%	63	0%	2%	No
SL	**196**	**11%**	**63**	**2%**	**9%**	**Yes**
CD	196	0%	63	0%	0%	No
OHI	196	0%	63	0%	0%	No
Male	196	65%	63	52%	13%	No
NatAmer	196	1%	63	2%	-1%	No
Black	196	46%	63	52%	-6%	No
Hispanic	196	19%	63	21%	-2%	No
Asian, Not Southeast Asian	196	1%	63	2%	-1%	No
Southeast Asian	196	6%	63	10%	-4%	No
White	**196**	**27%**	**63**	**14%**	**13%**	**Yes**
Two Adult Household	196	54%	63	52%	2%	No
Par Educ HS Diploma	196	26%	63	30%	-4%	No
Par Educ Voc Tech	196	19%	63	16%	3%	No
Par Educ LT HS	**196**	**10%**	**63**	**2%**	**8%**	**Yes**
Par Educ Coll Deg	196	6%	63	5%	1%	No
Par Educ Grad Prof	196	5%	63	2%	3%	No
Par Educ No Info	196	35%	63	46%	-11%	No
Pre Test Scores						
RR Fall LTR ID	133	44	28	44	0	No
RRFallWord	133	2	28	2	0	No
RR Fall Cap	133	12	28	12	1	No
RR Fall Writ Voc	133	6	28	6	0	No
RR Fall Dict	133	13	28	14	-1	No
RR Fall TRL	133	.65	28	0.43	0.22	No
Gain Fall to Spr Letter ID	119	8	22	9	-0.7	No
Gain Fall to Spr Word	119	14	22	16	-1.4	No
Gain Fall to Spr CAP	119	7	22	9	-2.0	No
Gain Fall to Spr Writ Voc	119	34	22	36	-2.0	No
Gain Fall to Spr Dictation	119	20	22	21	-1.1	No
Gain Fall to Spr TRL	119	12	22	14	-2.3	No
Other Measures						
Gr 1 Att Rate	196	93.6	63	92.6	1.0	No
Days Enroll MMSD Gr 1	196	168	63	153	14.7	No
Kind Att Rate	196	93.0	39	91.1	1.9	No
Reading Recovery Outcomes						
Recommended	**196**	**29%**	**63**	**16%**	**13%**	**Yes**
Incomplete	196	20%	63	29%	-9%	No
Discontinued	196	41%	63	43%	-2%	No
Other	196	10%	63	13%	-3%	No

Missing Cases 2007-08 School Year 20% of Reading Recovery students excluded						
	RR Included in Regression		RR Excluded from Regression		Difference Between	
Group	N	Mean	N	Mean	Include/Exclud	Significant?
Demographics						
FreeLunch	206	77%	53	70%	7%	No
ReducedLunch	206	5%	53	8%	-3%	No
ELL3rdFri	206	29%	53	30%	-1%	Yes
Gr 1 Spec Ed 3rd Fri	206	16%	53	11%	5%	No
LD	206	0%	53	0%	0%	No
AUT	206	0%	53	0%	0%	No
ED	206	0%	53	0%	0%	No
SL	**206**	**11%**	**53**	**4%**	**7%**	**Yes**
CD	206	0%	53	0%	0%	No
OHI	206	0%	53	0%	0%	No
Male	206	61%	53	58%	3%	No
NatAmer	206	1%	53	0%	1%	No
Black	206	46%	53	47%	-1%	No
Hispanic	206	21%	53	19%	2%	No
Asian, Not Southeast Asian	206	1%	53	0%	1%	No
Southeast Asian	206	8%	53	9%	-1%	No
White	206	22%	53	25%	-3%	No
Two Adult Household	206	59%	53	45%	14%	No
Par Educ HS Diploma	206	22%	53	23%	-1%	No
Par Educ Voc Tech	206	19%	53	19%	0%	No
Par Educ LT HS	206	6%	53	9%	-3%	No
Par Educ Coll Deg	206	3%	53	4%	-1%	No
Par Educ Grad Prof	206	4%	53	8%	-4%	No
Par Educ No Info	206	45%	53	38%	7%	No
Pre Test Scores						
RR Fall LTR ID	134	44	32	42	2	No
RRFallWord	131	2	31	1	1	No
RR Fall Cap	**131**	**12**	**31**	**10**	**2**	**Yes**
RR Fall Writ Voc	131	7	31	6	2	No
RR Fall Dict	134	15	32	12	3	No
RR Fall TRL	134	.66	32	0.59	0.07	No
Gain Fall to Spr Letter ID	116	8	28	11	-2.5	No
Gain Fall to Spr Word	113	14	27	16	-1.3	No
Gain Fall to Spr CAP	113	8	27	10	-1.9	No
Gain Fall to Spr Writ Voc	113	36	27	45	-9.4	No
Gain Fall to Spr Dictation	116	19	28	22	-3.1	No
Gain Fall to Spr TRL	116	13	28	14	-1.5	No
Other Measures						
Gr 1 Att Rate	206	92.5	53	92.3	0.2	No
Days Enroll MMSD Gr 1	206	164	53	158	6.0	No
Kind Att Rate	206	92.7	25	89.7	3.0	No
Reading Recovery Outcomes						
Recommended	206	25%	53	15%	10%	No
Incomplete	206	18%	53	23%	-5%	No
Discontinued	206	49%	53	55%	-6%	No
Other	206	8%	53	8%	0%	No

Missing Cases 2008-09 School Year 31% of Reading Recovery students excluded						
	RR Included in Regression		RR Excluded from Regression		Difference Between	
Group	N	Mean	N	Mean	Include/Exclude	Significant?
Demographics						
FreeLunch	178	78%	84	85%	-7%	
ReducedLunch	178	4%	84	2%	2%	
ELL3rdFri	178	22%	84	20%	2%	
Gr 1 Spec Ed 3rd Fri	178	24%	84	17%	7%	
LD	178	0%	84	0%	0%	
AUT	178	0%	84	0%	0%	
ED	178	1%	84	0%	1%	
SL	**178**	**16%**	**84**	**7%**	**9%**	**Yes**
CD	178	0%	84	1%	-1%	
OHI	178	0%	84	0%	0%	
Male	178	61%	84	61%	0%	
NatAmer	178	2%	84	0%	2%	
Black	178	52%	84	54%	-2%	
Hispanic	178	25%	84	21%	4%	
Asian, Not Southeast Asian	178	1%	84	2%	-1%	
Southeast Asian	178	3%	84	7%	-4%	
White	178	18%	84	15%	3%	
Two Adult Household	178	52%	84	52%	0%	
Par Educ HS Diploma	178	25%	84	29%	-4%	
Par Educ Voc Tech	178	15%	84	13%	2%	
Par Educ LT HS	178	6%	84	10%	-4%	
Par Educ Coll Deg	178	4%	84	1%	3%	
Par Educ Grad Prof	178	4%	84	2%	2%	
Par Educ No Info	178	44%	84	45%	-1%	
Pre Test Scores						
RR Fall LTR ID	124	44	44	44	0	
RRFallWord	124	2	43	2	0	
RR Fall Cap	124	12	43	11	0	
RR Fall Writ Voc	124	6	43	6	0	
RR Fall Dict	124	12	44	14	-2	
RR Fall TRL	124	.49	44	0.59	-0.1	
Gain Fall to Spr Letter ID	106	8	38	8	-0.5	
Gain Fall to Spr Word	106	15	37	14	0.1	
Gain Fall to Spr CAP	106	8	37	9	-1.1	
Gain Fall to Spr Writ Voc	106	38	37	39	-1.2	
Gain Fall to Spr Dictation	106	21	38	19	1.7	
Gain Fall to Spr TRL	106	13	38	12	0.4	
Other Measures						
Gr 1 Att Rate	178	92.8	84	92.1	0.7	
Days Enroll MMSD Gr 1	178	167	84	159	8.2	
Kind Att Rate	**178**	**91.7**	**61**	**88.9**	**2.8**	**Yes**
Reading Recovery Outcomes						
Recommended	**178**	**34%**	**84**	**19%**	**15%**	**Yes**
Incomplete	178	19%	84	24%	-5%	
Discontinued	178	40%	84	46%	-7%	
Other	178	7%	84	11%	-3%	

Appendix E: MMSD Comprehensive Literacy Model

MMSD Comprehensive Literacy Model



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