

READING RECOVERY EVALUATION

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Executive Summary

This study analyzes data for Reading Recovery students receiving services between the 1989-90 and 2003-04 school years. The approach relies on longitudinal data wherever possible. Comparison groups are employed in most analyses when appropriate using various methods. More recent assessment data particularly that derived from the district's Primary Language Arts Assessment (PLAA) are the basis for many of the pre- and post-treatment measures.

Listed below are key findings from the study:

- Between 1989-90 and 2003-04, 3,781 students (13% of all first grade students) have received Reading Recovery services. Seventeen percent of all first graders in the 2003-04 school year received Reading Recovery services. Fifty-seven percent (2,153) of the Reading Recovery students from 1989-90 to 2003-04 have been 'discontinued' (successfully graduated) from the program.
- Reading Recovery clearly serves a population of needy students based on income and other demographic factors. Reading Recovery serves a population that has deficits in reading ability at the beginning of Grade 1. However, it is not clear that they constitute the lowest 20-25% of all first graders, a stated goal of the program developers.
- In 2003-04, 48% of participating students were discontinued, 25% were 'recommended' (i.e., need additional services) and 22% received an 'incomplete' program (i.e., mainly students who started the program after 1st Semester, Rounds 2 and 3). For the 14 years the program has been in place in the MMSD, 61% of lessons were provided to 'discontinued' students and 35% to incomplete and recommended students.
- In 2003-04, the total salary cost of the MMSD Reading Recovery program was \$1,234, 935. The number of students served was 305. Using Virchow-Krause estimates for the program in 2000-01 and looking at the 2003-04 school year, it costs an average of \$4,200 to provide Reading Recovery to a student and approximately \$8,400 to produce a successful (i.e., discontinued and reads at the average band for their grade) Reading Recovery student. This is based only on teacher salary. This amount is probably low since the cost estimate was done in 2000-01.
- Current research is mixed, although generally positive, on the effectiveness of Reading Recovery. Studies published by the Reading Recovery Council are invariably positive. Most RRC studies report success rates of 75-85% with students receiving a full program (sometimes defined 60 lessons, and sometimes 20 weeks). In the MMSD (using 60 lessons as a full program) we see success rates around 60%. In Madison, the proportion of students discontinued from the program has been below 50% for the past two years. Nationally about 60% of students who enter the Reading Recovery program are discontinued.
- When combining both successful RR students and the unsuccessful RR students over an entire school year of service delivery the overall program impact does not yield statistically significant achievement gains when comparing performance of

participants to similar but non-participating students after controlling for intervening affects (e.g., poverty, special education status, parent education, etc.).

In general, RR students participating in Round 1 tend to outperform Round 2 students when compared to similar, but non-participating students. However, when combining Round 1 and Round 2 RR students for an entire school year the overall program does not yield statistically significant achievement gains when comparing performance of participants to similar but non-participating students.

- Given the significant MMSD investments in classroom teacher literacy professional development, lower class size, summer literacy programs, and other community support initiatives it may be difficult to discern a significant, positive program impact for isolated specifically to the RR when comparing program participants to other similar but non-participating MMSD students. As evidence, the average text reading level for all MMSD students has steadily risen over the past 5 years. In essence, the bar for determining success continues to rise for all students.

Recommendations:

- There appears to be a need to develop a better method for identifying students who could be successful in this program. In 2003-04, more than half of all Reading Recovery students were not discontinued. Targeting services more efficiently to students who benefit most is strongly encouraged. The longitudinal data provided by the district's Primary Language Arts Assessments (PAA) may be a useful resource in developing such predictive tools while simultaneously affording meaningful instructional and diagnostic information.
- Round 1 RR students appear to have more success as a result of program interventions than Round 2 students. Round 2 is more likely to have incomplete program outcomes. There should be a strategic review evaluating how Reading Recovery resources are used during the latter portion of the school year. For example, a more efficient approach might be one in which the RR literacy instruction method is applied to small groups of students, rather than one-on-one to students.

While the Reading Recovery program has benefited MMSD students over the years a discussion of program and its role in improving student's reading abilities in the primary grades is warranted.

Overview

This report is an analysis of the Reading Recovery program. It grows out of a preliminary study conducted June, 2000. The former study matched Reading Recovery students to similar students based on pre-test score, gender, ethnicity and income. The general hypothesis of the earlier research as well as this extended study was that Reading Recovery students would score significantly higher on measures of reading skills when compared to similar students who did not receive the program's services.

Students who were 'discontinued' (i.e., successfully graduated by achieving a target reading level threshold) from the Reading Recovery program were found to score significantly higher than similar students who did not receive Reading Recovery. However, Reading Recovery students as a whole were found to perform significantly lower on many of these assessment measures when compared to students who did not receive Reading Recovery.

The report is organized in the following fashion:

1. Review of Other Reading Recovery Research
2. Overview of Reading Recovery program by outcomes and costs
3. Examination of students selected to receive Reading Recovery services
4. Net program impacts specific to the MMSD Reading Recovery program on student achievement

1. Review of Other Reading Recovery Research

The Reading Recovery Council of North America continues to publish numerous studies attesting to the benefits of the Reading Recovery program. In 2003 a new collection of studies, "Research in Reading Recovery" Volume 2, edited by Forbes and Briggs was published.

Of the 14 studies in the book only the last study "Children's Achievement and Personal and Social Development in a First-Year Reading Recovery Program with Teachers in Training" was a random assignment study. This study found significant benefits from the Reading Recovery program across several outcome measures including the Iowa Test of Basic Skills, Gates-MacGinitie Reading Tests, a Classroom Teacher Assessment of Student Progress, Retention Rates and the Observation Summary. Reading Recovery students in this district outperformed a control group in all areas. The study assures us that the control group and Reading Recovery students were similar in terms of gender, ethnicity and their scores on each of the subtests of the Observation Summary. The sample size of 107 in each group is quite large and the reported mean scores are impressive. The rigorous implementation of the program in this school district could contribute to the success of their program.

This study was done in a poor southern school district. It is possible that regular classroom literacy instruction may not be as of high a quality as that in Madison. This would tend to result in larger relative gains for Reading Recovery students in this district compared with the performance of the RR program in the MMSD. If literacy instruction in the regular classroom is high, it may be more difficult to achieve a positive program effect.

Generally, current research is mixed, but positive, on the effectiveness of Reading Recovery. Studies published by the Reading Recovery Council are invariably positive. Most RRC studies report success rates of 75-85% with students receiving a full program (sometimes defined 60 lessons, and sometimes 20 weeks). In the MMSD (using 60 lessons as a full program) we see success rates around 60%. In Madison, the proportion of students discontinued from the program has been below 50% for the past two years. Nationally about 60% of students who enter the Reading Recovery program are discontinued.

2. Descriptive Information of Reading Recovery in the MMSD

A. Program Outcome Statistics

Reading Recovery is an intensive intervention program for 1st graders who are struggling with reading. Students judged to be in the bottom 20-25% of a class in reading (determined by the teacher using the Reading Recovery Observation Summary Test) are eligible to receive this program. The program consists of ½ hour per day of one-on-one instruction by a teacher trained in the Reading Recovery instructional strategy. The Reading Recovery program lasts for 12-20 weeks.

Students receiving this instruction are ‘discontinued’ if they successfully reach average reading level of their peer group (all non-Reading Recovery 1st graders). Another possible student outcome with Reading Recovery is a “recommended” status. In this case the student did not become a successful reader but may benefit from other services. There is also the “incomplete” status that indicates a student who did not receive the full Reading Recovery program. Once a student is moved out of the program, another student is enrolled in the program.

Many students who start in the second round do not have the opportunity to finish the program because there isn’t enough time left in the school year. As will be noted later in this analysis, Round 2 students tend to perform less well than Round 1 students.

Reading Recovery was instituted in MMSD beginning in the 1989-90 school year. Through the 2003-04 school year, 3,782 students had received Reading Recovery services. This represents 13% of all 1st graders enrolled in MMSD between the 1989-90 and 2003-04 school years. In the 2003-04 school year, 17% of all 1st graders received Reading Recovery services. This figure is close to 20%, the point that Reading Recovery defines as “full implementation.” The Reading Recovery program believes that full implementation is necessary to have a successful program. Table 1 shows Reading Recovery enrollments and outcomes for the past 12 years.

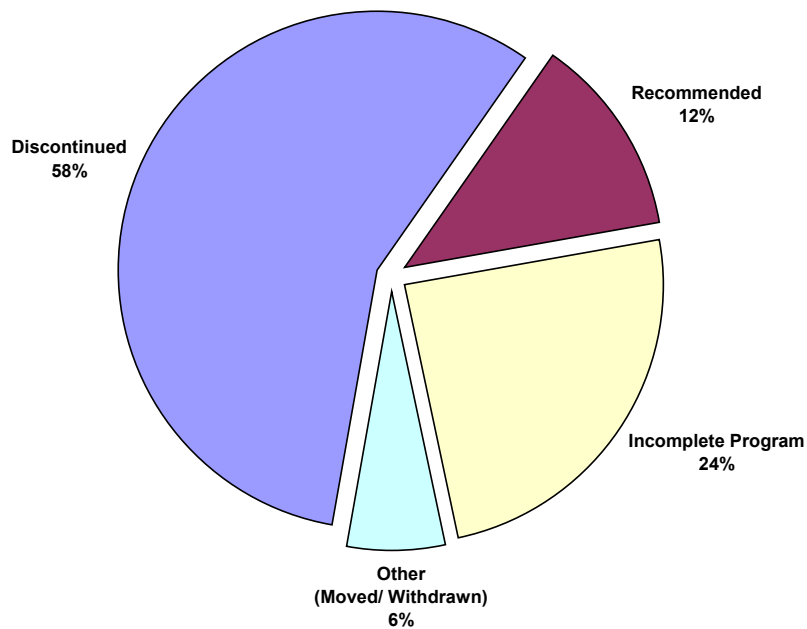
Table 1: Reading Recovery Students and Outcomes 1989-1990 to 2003-04

Year	Discontinued		Recommended		Incomplete Program		Other (Moved/ Withdrawn)		Total	Third Friday in September Grade 1 Enrollments	Received Reading Recovery
	n	%	n	%	n	%	n	%		n	%
89-90	31	76%	6	15%	4	10%	0	0%	41	1956	2%
90-91	71	54%	14	11%	42	32%	4	3%	131	2070	6%
91-92	83	63%	6	5%	32	24%	11	8%	132	2091	6%
92-93	100	64%	11	7%	38	24%	8	5%	157	2180	7%
93-94	137	63%	14	6%	56	26%	12	5%	219	2211	10%
94-95	176	55%	34	11%	85	26%	27	8%	322	2098	15%
95-96	202	67%	19	6%	67	22%	12	4%	300	2079	14%
96-97	198	61%	27	8%	79	24%	19	6%	323	2080	16%
97-98	185	60%	20	6%	74	24%	29	9%	308	1955	16%
98-99	161	52%	34	11%	91	30%	22	7%	308	1868	16%
99-00	184	58%	37	12%	68	21%	29	9%	318	1902	17%
00-01	173	53%	65	20%	78	24%	12	4%	328	1701	19%
01-02	162	54%	50	17%	70	23%	17	6%	299	1753	17%
02-03	144	49%	66	23%	62	21%	19	7%	291	1808	16%
03-04	146	48%	68	22%	76	25%	15	5%	305	1829	17%
Total	2153	57%	471	12%	922	24%	236	6%	3782	29581	13%

As the above table shows, 57% of all Reading Recovery students have been 'discontinued' (i.e., successfully graduated), from the program during that time. Twenty four percent of all participating students began but did not complete the program. Incomplete program participants are mainly Round 2 children. In 2003-04, 25% of all participating students were 'incomplete.' These students received what is considered a full program (i.e., at least 60 lessons), but were not successful as defined by the Reading Recovery program (i.e., average reading level of their peer group). A third group of students cited by the program are student recommended for other services, most often special education services.

Figure 1 shows MMSD RR cumulative outcomes over the past 12 years:

Figure 1: Reading Recovery Outcomes 1989-1990 to 2003-04



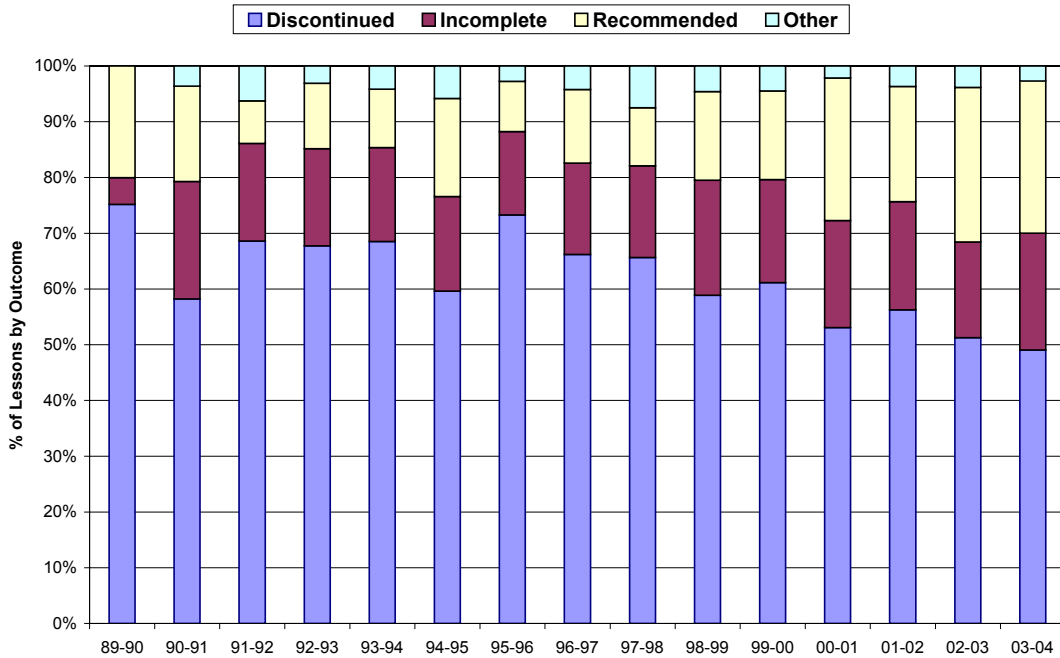
The basic unit of service in Reading Recovery is the “lesson.” The MMSD Reading Recovery program database records the number of lessons that each student receives. An examination of the proportion of total program lessons associated with each program outcome category provides an interesting study in resource utilization as well as trends in outcomes.

Table 2: Proportion of Reading Recovery Lessons Provided by Outcome

Year	Discontinued	Recommended	Incomplete	Other
89-90	75%	20%	5%	0%
90-91	58%	17%	21%	4%
91-92	69%	8%	18%	6%
92-93	68%	12%	17%	3%
93-94	69%	10%	17%	4%
94-95	60%	18%	17%	6%
95-96	73%	9%	15%	3%
96-97	66%	13%	16%	4%
97-98	66%	10%	16%	7%
98-99	59%	16%	21%	5%
99-00	61%	16%	18%	4%
00-01	53%	26%	19%	2%
01-02	56%	21%	19%	4%
02-03	51%	28%	17%	4%
03-04	49%	27%	21%	3%
Total	61%	17%	18%	4%

Table 2 shows that 61% of all lessons for the past 15 years have been provided to discontinued students. The lessons provided to incomplete students has remained fairly stable while the proportion of lessons provided to recommended students has increased from a low of 8% in 91-92 to 28% in the 2002-03 school year. Figure 2 shows the distribution by outcome.

Figure 2: Percent of Reading Recovery Lessons by Outcome Group



B. Program Costs

In the 2001-2002 Functional Analysis prepared by the Virchow Krause & Company consulting firm, the estimated cost per pupil for the Reading Recovery program was \$4,049. Using the total number of lessons and students from 2000-01 we can derive an estimated per lesson cost of \$65.83 (328 students divided by 20,173 lessons). Using this estimate, we can calculate the cost for providing Reading Recovery lessons to each program outcome group (see Table 3).

Because some groups receive more lessons per student the total costs associated with that program outcome are higher. For example, recommended students average 88 lessons for a total cost of \$1,663,000, while the average lessons and total cost for discontinued students are 64 and \$7,127,000, respectively. Table 4 recalculates costs per student based on these total costs by program outcome. It is important to keep in mind that these cost estimates include salary costs – it does not include teacher training or materials.

Table 3: Cost Per Outcome Group Based on \$65.83 Per Lesson
Dollars expressed in Thousands (000) e.g. \$137 = \$137,000

Year	Discontinued			Recommended			Incomplete			Other			
	# of Students	Average Lessons Per Student	Total Cost (\$000)	# of Students	Average Lessons Per Student	Total Cost (\$000)	# of Students	Average Lessons Per Student	Total Cost (\$000)	# of Students	Average Lessons Per Student	Total Cost (\$000)	Total Cost (\$000)
89-90	31	67	\$ 137	6	92	\$ 36	4	33	\$ 9		-	-	\$ 182
90-91	71	61	\$ 287	14	92	\$ 84	42	38	\$ 104	4	67	\$ 18	\$ 493
91-92	83	60	\$ 328	6	92	\$ 36	32	40	\$ 84	11	41	\$ 30	\$ 478
92-93	100	66	\$ 433	11	104	\$ 75	38	45	\$ 112	8	38	\$ 20	\$ 640
93-94	137	61	\$ 549	14	91	\$ 84	56	37	\$ 135	12	44	\$ 35	\$ 803
94-95	176	66	\$ 760	34	100	\$ 224	85	39	\$ 217	27	42	\$ 74	\$ 1,275
95-96	202	65	\$ 859	19	84	\$ 105	67	40	\$ 175	12	41	\$ 33	\$ 1,173
96-97	198	64	\$ 834	27	93	\$ 166	79	40	\$ 206	19	42	\$ 53	\$ 1,260
97-98	185	63	\$ 762	20	92	\$ 121	74	39	\$ 191	29	46	\$ 87	\$ 1,160
98-99	161	67	\$ 712	34	86	\$ 192	91	42	\$ 249	22	38	\$ 55	\$ 1,209
99-00	184	63	\$ 761	37	81	\$ 198	68	51	\$ 230	29	29	\$ 56	\$ 1,245
00-01	173	62	\$ 705	65	79	\$ 340	78	50	\$ 255	12	36	\$ 28	\$ 1,328
01-02	162	66	\$ 709	50	79	\$ 261	70	53	\$ 244	17	41	\$ 46	\$ 1,260
02-03	144	63	\$ 600	66	75	\$ 325	62	49	\$ 201	19	36	\$ 45	\$ 1,170
03-04	146	63	\$ 604	68	75	\$ 336	76	52	\$ 259	15	34	\$ 33	\$ 1,232
Total	2153	64	\$ 9,040	471	83	\$ 2,584	922	44	\$ 2,669	236	40	\$ 614	\$ 14,908

Table 4: Cost Per Pupil by Outcome Group Using 2000-01 Cost Per Lesson \$65.83

Year	Discontinued	Recommended	Incomplete	Other	Total
89-90	\$ 4,408	\$ 6,067	\$ 2,172	\$ -	\$ 4,433
90-91	\$ 4,040	\$ 6,023	\$ 2,475	\$ 4,427	\$ 3,762
91-92	\$ 3,951	\$ 6,056	\$ 2,617	\$ 2,723	\$ 3,621
92-93	\$ 4,334	\$ 6,822	\$ 2,938	\$ 2,477	\$ 4,076
93-94	\$ 4,008	\$ 6,000	\$ 2,406	\$ 2,886	\$ 3,665
94-95	\$ 4,319	\$ 6,597	\$ 2,549	\$ 2,745	\$ 3,960
95-96	\$ 4,255	\$ 5,540	\$ 2,617	\$ 2,715	\$ 3,909
96-97	\$ 4,213	\$ 6,149	\$ 2,612	\$ 2,796	\$ 3,900
97-98	\$ 4,117	\$ 6,037	\$ 2,579	\$ 2,999	\$ 3,767
98-99	\$ 4,420	\$ 5,656	\$ 2,740	\$ 2,514	\$ 3,924
99-00	\$ 4,138	\$ 5,354	\$ 3,376	\$ 1,923	\$ 3,914
00-01	\$ 4,074	\$ 5,228	\$ 3,268	\$ 2,370	\$ 4,049
01-02	\$ 4,375	\$ 5,212	\$ 3,489	\$ 2,707	\$ 4,213
02-03	\$ 4,166	\$ 4,921	\$ 3,237	\$ 2,363	\$ 4,022
03-04	\$ 4,140	\$ 4,946	\$ 3,402	\$ 2,207	\$ 4,041
Total	\$ 4,199	\$ 5,487	\$ 2,895	\$ 2,600	\$ 3,942

As Tables 3 and 4 suggest, program efficiency is improved by reducing the proportion of resources devoted to students in the recommended and incomplete program outcomes. Interestingly, while fewer resources are being expended on the discontinued and recommended categories on a per student basis in recent years, the proportion spent on incomplete outcomes has increased resulting in virtually no change in total cost per student over time. This warrants a reassessment of how program efforts could be reallocated away from incomplete outcomes perhaps by better predicting students who would be successful in Reading Recovery.

The costs per student identified in the Functional Analysis are based on all Reading Recovery participants. Another basis for estimating program costs is by focusing on the discontinued outcome, defined by Reading Recovery as a “successful reader.” Using this definition we can derive the cost per successful reader (taking the total cost). Table 5 shows the cost per successful reader, approximately \$8,459 in 2003-04.

Table 5: Cost Per Discontinued (Successful) Student

Year	Total Cost at \$4,049 Per Student	# of Discontinued Students	Cost Per Discontinued Student
89-90	\$ 166,009	31	\$ 5,355
90-91	\$ 530,419	71	\$ 7,471
91-92	\$ 534,468	83	\$ 6,439
92-93	\$ 635,693	100	\$ 6,357
93-94	\$ 886,731	137	\$ 6,472
94-95	\$ 1,303,778	176	\$ 7,408
95-96	\$ 1,214,700	202	\$ 6,013
96-97	\$ 1,307,827	198	\$ 6,605
97-98	\$ 1,247,092	185	\$ 6,741
98-99	\$ 1,247,092	161	\$ 7,746
99-00	\$ 1,287,582	184	\$ 6,998
00-01	\$ 1,328,072	173	\$ 7,677
01-02	\$ 1,210,651	162	\$ 7,473
02-03	\$ 1,178,259	144	\$ 8,182
03-04	\$ 1,234,945	146	\$ 8,459
Total	\$ 15,313,318	2,153	\$ 7,113

2. Student Selected for Reading Recovery Services

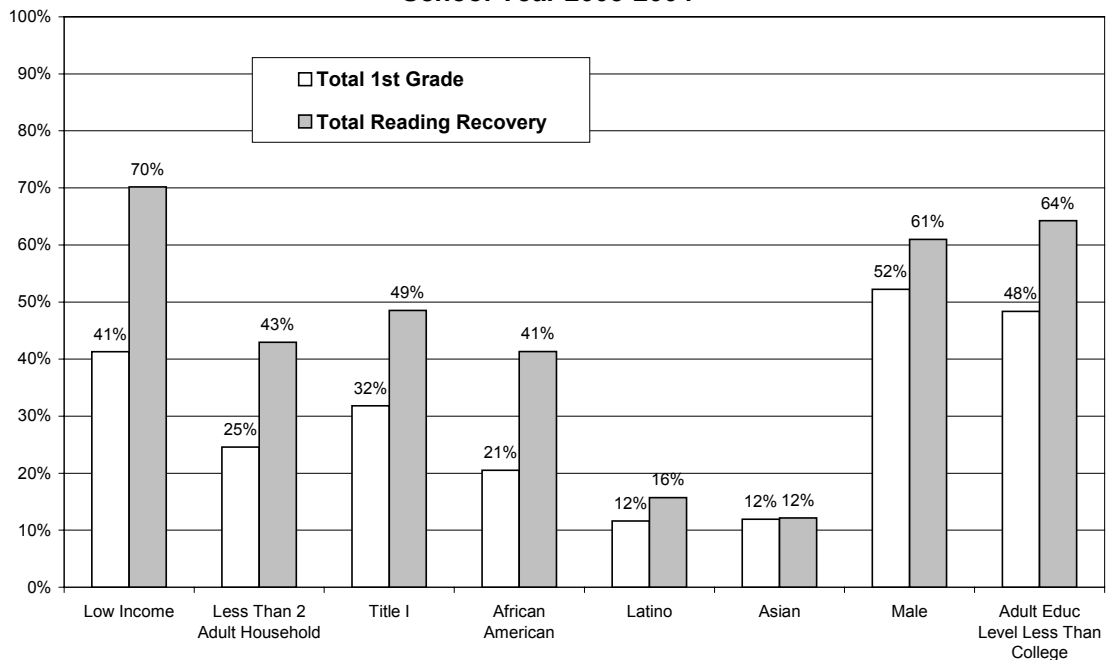
A. Demographic Characteristics of the Reading Recovery Population

Reading Recovery populations differ from the total district grade 1 population. In the 2003-2004 school year Reading Recovery students were more likely than the district as a whole to be:

- low income (70% Reading Recovery vs. 41% district),
- live in a household with less than 2 parents (43% Reading Recovery vs. 30% District),
- receive Title I services (49% vs. 32%),
- African American (41% vs. 21%)
- live in a household where the parent has less than a college education (64% vs. 48%) and
- Male (61% vs. 52%).

Figure 3 illustrates the differences between the Reading Recovery students and the general grade 1 population for the 2003-04 school year.

**Figure 3: Reading Recovery Compared to District Grade 1
School Year 2003-2004**



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.

Table 6 illustrates these differences clearly. Reading Recovery has a significantly higher percent of low income, single parent and African American students compared to the total Grade 1 cohort.

Table 6: Demographic Characteristics Reading Recovery/District First Grade 2003-04

Demographic	Total 1st Grade	Total Reading Recovery	Discontinued	Recommended	Incomplete	Other
Low Income	41%	70%	61%	76%	83%	67%
Less Than 2 Adult Household	25%	43%	36%	47%	49%	60%
Title I	32%	49%	51%	51%	43%	40%
African American	21%	41%	35%	47%	46%	53%
Latino	12%	16%	18%	18%	12%	0%
Asian	12%	12%	12%	9%	16%	13%
Male	52%	61%	58%	65%	62%	73%
Adult Educ Level Less Than College	48%	64%	63%	71%	63%	53%
ESL	16%	20%	22%	18%	21%	7%

A. Student Achievement Factors

As could be expected based on the program identification criteria, Reading Recovery students have lower scores than other first graders on both the MMSD Kindergarten Primary Language Arts Assessment and the MMSD Primary Language Arts Assessment (PLAA) Fall Grade 1.

The Reading Recovery student selection procedure has kindergarten teachers rank students low to high on literacy. The lowest 20% are then administered the Observation Summary, a Reading Recovery battery of assessment information. Based on a review of all of the subtests of the Summary, students are ranked and placed in Reading Recovery beginning with the lowest readers first.

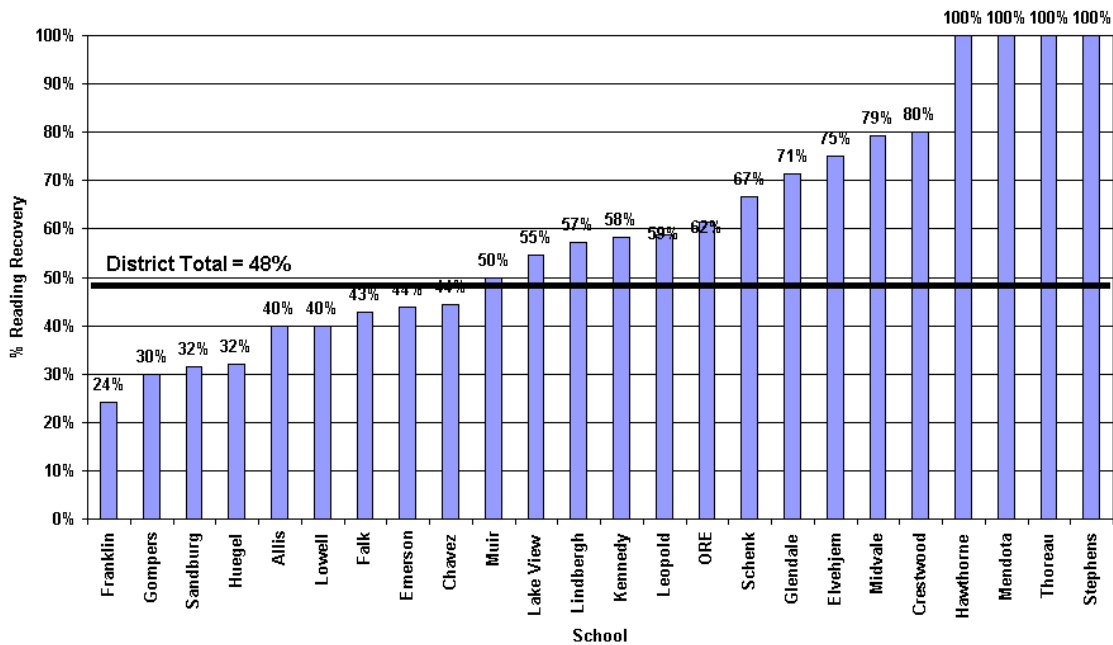
The following table attempts to replicate the ranking process for all Kindergarten students on their scores on the Primary Language Arts Assessment – from low to high. The average ranking is then used to rank students. Table 7 shows the number and percent of the lowest 20% (using this system) who receive Reading Recovery in the district.

Table 7						
2002-2003 School Year Participation in Reading Recovery						
Who gets Reading Recovery? Based on PLAA Average Ranking						
	Top 80%		Lowest 20%		Total RRC	% Lowest 20% Receiving RR
	No RRC	RRC	No RRC	RRC		
Allis	57	3	6	4	7	40%
Crestwood	49	3	1	4	7	80%
Elvehjem	56	4	1	3	7	75%
Emerson	36	1	9	7	8	44%
Franklin	79	0	22	7	7	24%
Glendale	28	7	2	5	12	71%
Gompers	29	4	7	3	7	30%
Falk	23	1	8	6	7	43%
Hawthorne	25	10	0	9	19	100%
Lake View	26	2	5	6	8	55%
Lapham	55	0	6	0	0	0%
Muir	53	1	5	5	6	50%
Lowell	33	3	6	4	7	40%
Mendota	15	10	0	2	12	100%
Midvale	63	18	5	19	37	79%
Thoreau	46	2	0	8	10	100%
ORE	26	0	5	8	8	62%
Schenk	33	5	1	2	7	67%
Shorewood	59	0	10	0	0	0%
Stephens	52	5	0	6	11	100%
Van Hise	30	0	7	0	0	0%
Kennedy	58	1	5	7	8	58%
Lincoln	4	0	1	0	0	0%
Huegel	44	0	17	8	8	32%
Chavez	66	0	10	8	8	44%
Sandburg	34	3	13	6	9	32%
Lindbergh	20	3	3	4	7	57%
Leopold	55	13	7	10	23	59%
Total	1154	99	162	151	250	48%

Reading Recovery serves a population of students at grade 1 who have deficits in reading ability. However, based on the analysis presented above it is unclear that the program is serving the lowest 20% of student across the district first. This is due partly to the fact that Reading Recovery is not available in all schools. Some schools may not be able to serve all their low literacy students while others serve all the lowest and some students who would not be in the lowest 20% at the district level.

Differences in need-based Reading Recovery participation rates are demonstrated by examining data by elementary school where the program is offered. Figure 4 illustrates the percent of students with the lowest Kindergarten Primary Language Arts Assessment scores in the 2003-04 school year who received Reading Recovery.

Figure 4: Percent of Students with Lowest Kindergarten PLAA Scores Defined as Lowest 20% Based Kindergarten Primary Language Arts Assessment by School Who Received Reading Recovery Services 2003-2004 School Year



4. Program Impact Evaluation

The evaluation analyses designed to measure the net effects of the MMSD Reading Recovery program on student achievement were analyzed using several approaches. The analyses attempt to answer the specific research question:

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.)?

Three different, but convergent, analytical methods were applied to this question: contingency table analysis of performance levels, differences in average scores, and a regression analysis. Each is discussed below.

A. Comparison of Changes in Performance Levels

In order to form more appropriate comparison groups, a method called ‘propensity scoring’ was used to create a comparison group for Reading Recovery students. This method begins by creating a predictive model for who will receive Reading Recovery. For all students a ‘propensity score’ is created that measures the propensity that student would have to receive Reading Recovery. This score is then used to pair Reading Recovery students with a student who did not receive Reading Recovery but had the propensity score closest to that Reading Recovery student. If a match was not within

.05 delta of the matched case (i.e. the program was unable to find a close match) the case was not included in the analysis. Comparison groups were created for discontinued Reading Recovery students as well as other Reading Recovery students.

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 although the match is closer and fewer cases are lost (unable to find similar match) for discontinued students.

Achievement data for the 2002-03 grade 1 cohort was analyzed to determine whether or not Reading Recovery students performance was significantly different from and the matched comparison group. The analysis compares end of grade 1 performance across the entire set of PLAA subtests. The analyses separated RR Round 1 and Round 2 students given the differences between the rounds in such important factors as time allotted to service students. Round 1 students included only those students successfully graduating from the program.

Some significant differences were found. Discontinued Reading Recovery students outperform the comparison group by 1.2 text reading levels while all other Reading Recovery students score almost 4 text reading levels less than their comparison group. Table 8 compares the Reading Recovery and their respective matched groups.

Table 8 Comparison of Groups

	2002-2003 School Year Discontinued		2002-2003 School Year All Other Reading Recovery			
	Round 1 Reading Recovery (n=126)	Comparison Non-Reading Recovery (n=126)	Sig.	Round 2 Reading Recovery (n=87)	Comparison Non-Reading Recovery (n=87)	Sig.
Average Scores:						
Kinder Screener	5.6	4.5	NS	5.5	4.9	NS
K PLAA Concepts About Print	15.6	15.3	NS	14.7	14.4	NS
K PLAA Sound or Word	20.9	19.0	.02***	19.3	18.0	NS
K PLAA Hearing Sounds	20.3	20.1	NS	18.3	19.7	NS
K PLAA Text Reading	2.7	2.7	NS	2.3	2.8	NS
K PLAA Upper Case	24.4	24.0	NS	24.7	23.6	NS
K PLAA Lower Case	24.6	24.2	NS	24.4	23.6	NS
Avg Rank (Total Grade 1) Kind PLAA	1064.3	1080.3	NS	1117.2	1116.8	NS
End of Grade 1 Text Reading	15.1	13.9	NS	9.4	13.3	.000***
Demographics (%):						
Male	58%	52%	NS	57%	53%	NS
Special Education	18%	19%	NS	26%	16%	NS
Title I	48%	47%	NS	34%	32%	NS
English Language Learner	22%	23%	NS	21%	28%	NS
Low Income	60%	63%	NS	68%	70%	NS
Two or More Adults in Household	65%	58%	NS	64%	71%	NS
Parent Coll Educ	23%	30%	NS	28%	29%	NS
African American	38%	32%	NS	38%	40%	NS
Hispanic	22%	18%	NS	16%	16%	NS
Asian	10%	8%	NS	9%	16%	NS
Rates:						
Kind Attendance	94.1	92.2	NS	92.7	92.9	NS
Gr 1 Attendance	95.3	94.7	NS	93.5	94.5	NS
Mobility Rate (Changes Per Year)	0.19	0.20	NS	0.18	0.22	NS
*** Significant at .05 level						

B. Comparison of Average Differences

Reading Recovery defines a successful student as one who reaches the “average band.” This level is operationalized as one-half standard deviation from the mean text reading level (TRL) for the non-Reading Recovery population. For this analysis, a surrogate for the average band was calculated as one-half standard deviations from the mean Spring Grade 1 TRL based on all students tested. Granted, this definition lowers the threshold of the band as it includes students who most likely had lower reading proficiencies than if the average had been based only on non-Reading Recovery students. Applying this approach in establishing an adequate performance threshold at the end of grade 1 yields a TRL of 15 or higher (mean=18, standard deviation=6).

Table 10 shows Round 1 Reading Recovery students and how they fared on the end of 1st Grade PLAA Text Reading level. The average Text Reading level at the end of 1st grade is 18 for all 1st graders. The standard deviation is 6 (1/2 SD = 3).

Table 10: End of Grade 1 Text Reading Levels 2002-2003 School Year - All Students Compared to Round 1 Reading Recovery

Average Band Defined as 1/2 SD from Average (18)

End of Grade 1 Text Reading Level	Total Grade 1	No Reading Recovery	All Reading Recovery	Discontinued	Recommended	Incomplete (None)	Other
0	2%	1%	2%	3%	0%		13%
1	0%	0%	0%	0%	0%		0%
3	2%	1%	7%	0%	10%		38%
5	3%	2%	10%	2%	20%		0%
7	4%	2%	11%	5%	17%		13%
9	4%	4%	6%	0%	12%		13%
11	4%	2%	7%	3%	12%		0%
13	4%	3%	11%	13%	7%		25%
14	6%	5%	9%	8%	10%		0%
Below Average Band	28%	21%	64%	35%	88%		100%
16	8%	7%	13%	22%	7%		0%
18	13%	12%	11%	22%	2%		0%
20	13%	14%	8%	15%	2%		0%
21	12%	14%	3%	5%	2%		0%
23	11%	13%	1%	2%	0%		0%
25	6%	7%	0%	0%	0%		0%
26	9%	11%	0%	0%	0%		0%
Above Average Band	72%	79%	36%	65%	12%		0%

It would be appropriate to analyze comparable groups. Using the previously described propensity score we can see how discontinued Reading Recovery students outperform a comparison group. While 60% of RR Round 1 discontinued student scored above the threshold only 38% of the comparison group performed at that level.

Table 11: End of Grade 1 Text Reading Levels Using Matched Comparison Group 2002-2003 School Year

End of Grade 1 Text Reading Level	Matched/Comparison Group	No Reading Recovery	Total Reading Recovery	Discontinued	Recommended	Incomplete	Other
0	3%	3%	2%	4%	0%	0%	13%
1	1%	1%	0%	0%	0%	0%	0%
3	5%	6%	3%	0%	11%	2%	25%
5	8%	5%	11%	1%	21%	23%	0%
7	9%	7%	11%	2%	18%	26%	25%
9	8%	10%	6%	2%	11%	9%	0%
11	9%	5%	12%	7%	16%	21%	0%
13	9%	12%	7%	10%	5%	2%	25%
14	11%	10%	11%	13%	9%	11%	0%
Below Average Band	62%	60%	63%	40%	91%	94%	88%
16	10%	9%	11%	18%	5%	2%	13%
18	14%	10%	19%	31%	2%	4%	0%
20	8%	11%	5%	8%	2%	0%	0%
21	3%	5%	1%	2%	0%	0%	0%
23	1%	2%	0%	1%	0%	0%	0%
25	1%	1%	0%	0%	0%	0%	0%
26	0%	0%	0%	0%	0%	0%	0%
Above Average Band	38%	40%	37%	60%	9%	6%	13%

Further review of Table 11 shows that despite the gains realized by the successfully completing RR students large majorities of students in the recommended, incomplete, and other Reading Recovery program outcome categories fail to reach the average threshold.

In addition to the average band threshold analysis, average Spring Grade 1 TRL scores were compared between the Reading Recovery and non-Reading Recovery groups. Table 12 presents the t-test results in which two analyses were performed – those including all of the lowest 20% of students in the district and a separate analysis including only the RR discontinued group matched to the comparison group.

Once again, only among the discontinued RR subgroup are significant positive impacts found. When focusing specifically on students successfully completing the Reading Recovery interventions and comparing their performance to similar, but non-participating students, performance for the former group significantly outpaces that of other students. This finding occurs for all students as well as the isolated low income subgroup.

Significant differences were not found when comparing all RR students with students in the lowest performance levels at the beginning of grade 1 across the entire district but who had not participated in RR.

**Table 12: T-Tests - Reading Recovery Compared to District Spring Grade 1 TRL 2002-2003
Lowest 20% Based on Average Rank of All Kindergarten PLAA Subtests**

		n	Mean	Std Dev	Std Err of Mean	t	df	(two-tailed)		Mean Diff		
All Students Lowest 20%	All Students	Not RR	137	11.14	6.28	0.54	0.30	276	0.767	NS	0.21	
		RR	141	10.93	5.49	0.46						
	Low Income	Not RR	74	10.77	5.58	0.65	0.32	181	0.751	NS	0.26	
		RR	109	10.51	5.21	0.50						
	LEP	Not RR	41	11.39	5.81	0.91	0.74	72	0.459	NS	1.00	
		RR	33	10.39	5.62	0.98						
	Afr Amer	Not RR	33	10.73	6.53	1.14	0.35	98	0.726	NS	0.43	
		RR	67	10.30	5.29	0.65						
	Hispanic	Not RR	30	10.27	5.58	1.02	-0.55	54	0.584	NS	-0.81	
		RR	26	11.08	5.37	1.05						
	Discontinued only	All Students	Not RR	137	11.14	6.28	0.54	-3.77	197	0.000	***	-3.43
			RR	62	14.56	5.08	0.65					
Low Income		Not RR	74	10.77	5.58	0.65	-3.93	117	0.000	***	-3.83	
		RR	45	14.60	4.37	0.65						
LEP		Not RR	41	11.39	5.81	0.91	-1.77	53	0.0822	NS	-3.18	
		RR	14	14.57	5.77	1.54						
Afr Amer		Not RR	33	10.73	6.53	1.14	-2.73	56.5	0.0085	**	-3.90	
		RR	27	14.63	4.51	0.87						
Hispanic		Not RR	30	10.27	5.58	1.02	-1.87	43	0.0684	NS	-3.27	
		RR	15	13.53	5.41	1.40						

*** Significant at the .01 level

** Significant at the .05 level

In summary, the analysis of average end of grade 1 data suggests that Reading Recovery participation yields gain that were significantly different from similar but non-participating students when isolating the successful completer category. As an entire program population the RR students did not significantly outpace similar, but non-participating students.

C. Regression Analysis

Regression models were developed to isolate the effects of RR intervention while simultaneously controlling for other intervening variables. Such factors as poverty, parent education level, special education status, ESL status, student mobility, and length of time the RR program was in operation at the school might account for some of the differences witnessed in student performance. In addition, the student's "beginning point" in regard to achievement impacts 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 RR program after accounting for the affect of these other variables on the student achievement by the end of grade 1.

As in the previous analysis involving t-test of average performance levels, the regression analyses suggest that discontinued students benefit from Reading Recovery intervention as measured by success on the Spring Grade 1 PLAA Text Reading level. However, once again other RR categories do not gain the expected number of text reading levels and participation in the program does not appear to increase their success on this measure.

Table13: Reading Recovery Analysis - Regression on End of First Grade Text Reading Level 2002-2003
All Students Enrolled 180 Days in 2002-2003 Reading Recovery =

	All Reading Recovery Students (Total n=1632, RR n=263)			Discontinued Only (Total n=1707, RR n=134)			Recommended Only (Total n=1630, RR n=57)			Incomplete Only (Total n=1641, RR n=65)		
	B	t	p	B	t	p	B	t	p	B	t	p
Number of Lessons per 1 Unit Text Reading Level Change *	80			48			28			16		
Program Variable: Number of Lessons	-0.012	-2.152	0.032	0.021	2.921	0.004	-0.036	-4.113	0.000	-0.062	-4.913	0.000
Explanatory Variables:												
Pre Score (Average PLAA Ranks)	-0.011	-23.361	0.000	-0.011	-22.171	0.000	-0.011	-22.544	0.000	-0.011	-22.189	0.000
Special Education	-2.552	-6.694	0.000	-2.651	-6.466	0.000	-2.946	-6.996	0.000	-3.078	-7.361	0.000
Low Income	-0.664	-2.157	0.031	NS			NS			-0.666	-2.057	0.040
Adult Education College or Higher	1.468	4.937	0.000	1.614	5.975	0.000	1.302	4.755	0.000	1.139	3.715	0.000
Mobility (Changes Per Year)	NS			-1.000	-2.053	0.040	-1.018	-2.053	0.040	NS		
# Years Reading Recovery in School	0.160	4.893	0.000	0.153	4.606	0.000	0.145	4.390	0.000	0.143	4.313	0.000
Title I	NS			-1.020	-2.433	0.015	-1.528	-3.377	0.001	-1.460	-3.132	0.002
R Square	0.507			0.451			0.522			0.508		

NS = Not Significant

NOTE: If the B value is negative, then, among the study population, holding other factors constant, the number of Reading Recovery lessons leads to a net decline of one (1) TRL. If positive, the number of Reading Recovery lessons leads to a net gain of one (1) TRL.

The column labeled B in Table 13 is the coefficient that indicates the amount of change expected in the dependent variable (i.e., Spring Grade 1 TRL) when there is a one-unit change in the predictor variable. The B value is to be interpreted as the independent, isolated impact of the program variable after controlling for all of the other variables included in the equation. For example, for the analysis relating to All Reading Recovery Students, the program variable shows a B value of -.036. This value is interpreted as the number of lessons needed to change the TRL by one (1) level. The first row in the table converts this coefficient into number of lessons required to generate a change in the student's end of year text reading level. In this example, if a recommended student receives twenty-eight Reading Recovery lessons, they gain one less text reading level

controlling for other all the other factors in the model, i.e., pre-score, special education status, income status, etc.

As can be seen from the All Reading Recovery Students portion of Table 13, several other factors are highly significant in explaining variation in student's Spring Grade 1 PLAA TRL scores. The list includes:

- the student's pre-program score (i.e. average rank on Kind PLAA subtests)
- whether or not the student receives special education services,
- whether or not the student is considered low income,
- whether or not the highest level of education among adults in the household is a college degree or higher,
- the number of years the Reading Recovery program had been in operation at the school.

The All RR Student analysis does not find that the student's mobility (# of school changes per year) to be a significant explanatory term in the end of grade 1 student achievement model.

The differences among program outcome categories varies widely. Discontinued students are positively impacted, holding all else constant, gaining one (1) text reading level for every 80 Reading Recovery lessons they receive. Other outcome groups, controlling for other factors, fail to gain the expected number of text reading levels. Recommended students fail to gain one (1) TRL for every 28 Reading Recovery lessons, while incomplete students fail to gain 1 text reading level for every 16 lessons.

An additional series of regression analyses were performed to determine the affects of the program as they varied by the round of reading Recovery in which the student participated. Reading Recovery students were separated into two groups: 1st round and 2nd and 3rd rounds. (Sometimes, some schools actually make it to a third round in serving RR students during a school year.)

Using the propensity scoring method, non-participating comparison groups were created and matched separately to the RR Round 1 and Round 2/3 participants. Then separate regression models with end of 1st grade text reading level as the outcome were created.

For Round 1 the Reading Recovery intervention was not a statistically significant factor in explaining Spring Grade 1 text reading level. In other words, Reading Recovery and non-Reading Recovery students, although similar on demographic as well as pre-test measures, did not perform differently. For the Round 2 and 3 analysis Reading Recovery students performed significantly lower than their matched non-participating cohort.

Reading Recovery Analysis - Regression on End of First Grade Text Reading Level 2002-2003
Reading Recovery and Comparison Group

	Round 1 Reading Recovery and Comparison Group (N= 85)			Round 2 Reading Recovery and Comparison Group (N=122)		
	B	t	p	B	t	p
Number of Lessons per 1 Unit Text Reading Level Change [^]	NS			44		
Program Variable: Number of Lessons	0.01	0.92	0.36101	-0.023	-2.05	0.04
Explanatory Variables:						
Pre Score (Average PLAA Ranks)	-0.01	-6.35	0.00000	-0.011	-23.36	0.00
Special Education	-3.58	-3.90	0.00014	-2.552	-6.69	0.00
Adult Education College or Higher	2.85	3.31	0.00114	1.8425	2.39	0.02
R Square	0.343			0.217		

NS = Not Significant

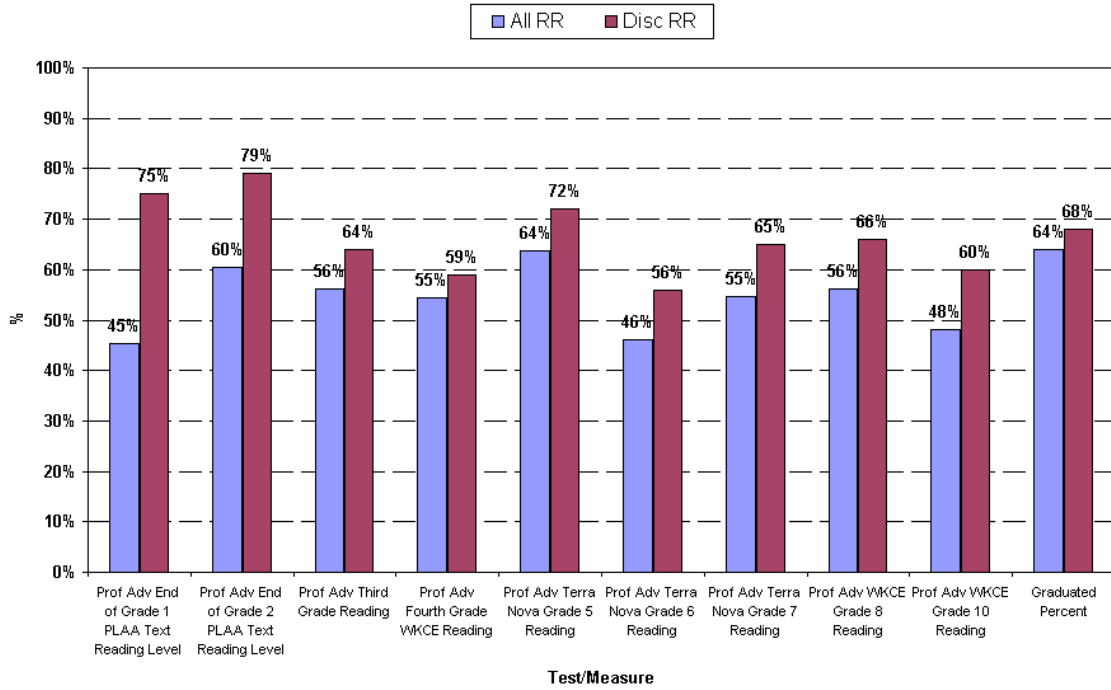
NOTE: If the B value is negative, then, among the study population, holding other factors constant, the number of Reading Recovery lessons leads to a net decline of one (1) TRL.
 If positive, the number of Reading Recovery lessons leads to a net gain of one (1) TRL.

D. Long-Term Impacts

In addition to the one-year gains analyzed in the previous sections, an attempt was made to investigate long-term historical impacts of the Reading Recovery program. For the series of achievement tests available in the district's student information system, RR participant scores were analyzed to determine the proportions scoring at the test's level considered to be proficient or higher. Two groups of RR participants were analyzed – those successfully discontinued and all RR participants.

Based on the analysis, there is some evidence that students who received the program and were successful continued to experience success in subsequent years. The following chart summarizes these outcomes and includes students from the inception of the MMSD RR program:

How have Discontinued and All Reading Recovery students fared?



Additional analyses must be performed that examine these long-term results using approaches much like those incorporated in the one year analyzes. There are other complicating factors when looking at long-term impacts that must be accounted for including the attrition of students through mobility and other interventions that students become exposed to over time.

Conclusions and Recommendations

This study finds a benefit in the first grade year for students who are successfully exited (i.e., “discontinued”) from the Reading Recovery program. Discontinued is defined by Reading Recovery as a student who:

- demonstrates independent reading and writing strategies that will allow continued achievement,
- can read within the average range of the class reading performance, and
- makes accelerated gains not only increasing knowledge but doing so at an accelerated rate.

In 2003-2004, discontinued students constituted 48% of the students who received Reading Recovery services. The proportion of Reading Recovery students that exit the program as discontinued has declined steadily over the past several years while other program outcomes (i.e., recommended, incomplete, and other) have increased.

Unlike discontinued students, the other Reading Recovery outcome category students not appear to achieve significant gains as a result of this program when comparing their performance to similar but non-participating students and after controlling for intervening factors.

Further, this study shows that Reading Recovery’s success with certain students can be documented. In this study, when looking at discontinued RR students only, we found a significant positive program impact for subgroups such as African American, low income, Hispanic and LEP students. However, some students continue to receive RR services and do not make the same positive net gains in achievement leading to a limited overall program effect.

It is easy to speculate on possible factors that may affect the limited positive outcomes of the MMSD Reading Recovery program. One obvious limitation is found in the level of resources committed to literacy beyond the Reading Recovery program. Teacher professional development, lower class sizes, summer literacy session and community support programs all impact the effect on student literacy for all district students. Compared with studies in other districts employing RR interventions effects in Madison are likely to be much more limited.

Because Reading Recovery instructional methods are considered best practices there is little doubt that such instructional methods are and have been implemented in district classrooms since the adoption of the program fourteen years ago. This phenomena, i.e. that many classroom teachers are using approaches similar to Reading Recovery, may be another possible explanation for why large program effects are not found comparing Reading Recovery students to non-Reading Recovery students. It is very likely part, but not all, of the explanation for a lack of program impacts. One analysis in this report used the number of years that Reading Recovery had been in the first graders' school as a variable, and appears to support this possibility.

Regardless of these systems limitations, it is clear from this study that not all district students benefit equally from the Reading Recovery program in its current form. Other school districts and the Reading Recovery Council report much higher discontinued rates. It may be advisable to examine how this program is operationally implemented in

Madison and how this differs from other school districts. The district would be well served to investigate other methods to address the needs of recommended students and different modes of service delivery for incomplete students in order to improve upon the program's overall cost effectiveness.

Reading Recovery research has claimed that the high cost of the program is offset by not having to place students in special education or Title I program. Unfortunately, there is little evidence in Madison which indicates the Reading Recovery population is placed in special education at a lower rate than other similar students. An example of the latter might be a small group instructional model (e.g. Arkansas Model).

The district should spend time developing a more refined understanding of who we predict will benefit from Reading Recovery and who will not. Models to predict enrollment in Reading Recovery are very imprecise. This may be due to inconsistencies in different schools in how students are being selected for this intervention. Applying more rigorous criteria on a district-wide basis may focus the program on students who will benefit from the intervention.

The district should also review how we use Reading Recovery resources during the latter portion of the school year, i.e., Round 2, as so many participants during that stage are incompleters. Incomplete and recommended students remain behind their peers in later years. More than half of MMSD Reading Recovery students are either incomplete or recommended. Again, perhaps a more efficient approach would be small groups rather than one-on-one tutoring for these students.

In conclusion, while the Reading Recovery program has benefited MMSD students over the years a discussion of program and its role in improving student's reading abilities in the primary grades is warranted.