

RBS Evaluation Design Summary

The local evaluator for this project is Research for Better Schools (RBS) with subcontracts to Edvantia and RMC Research Corporation. Throughout this document the abbreviation “RED” is used to indicate the Memphis Striving Readers Revised Evaluation Design, dated August 2, 2006.

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1. Brief Overview of Evaluation Design

The evaluation is being conducted in eight middle schools serving students in grades 6-8 in Memphis, Tennessee. The evaluations of both targeted and whole-school intervention components use randomized designs. For the targeted intervention in Year 1, students in grades 6-8 identified as struggling readers were randomly assigned to control and treatment groups within each of the eight schools. During Years 2 through 4, incoming 6th grade students identified as struggling readers will be randomly assigned to control and treatment groups within each school. For the whole school intervention, the eight schools were grouped into four matched pairs, and, within each pair, one school was randomly assigned to treatment, the other to control.

The Memphis **targeted intervention** curriculum is Read 180, developed by Scholastic Inc.

- The Read 180 model is based on a 90-minute block of extended instructional time and is provided to randomly selected students identified as struggling readers in place of regular language arts instruction.
- Students in the treatment group will receive Read 180 services each year of the four project years they are enrolled in a project middle school and continue to be eligible based on their previous year's TCAP reading/language arts score. Control group students will not receive Read 180 services. The evaluation of the impact of Read 180 services on students will consist of a contrast of the treatment group randomly assigned to receive these services to a control group randomly assigned to not receive Read 180 services.
- Read 180 impacts on instruction was not included as part of the project's revised evaluation design.
- Fidelity of Read 180 instruction to the treatment model will be assessed using data collected from teacher interviews and classroom observations, with protocols adapted from drafts designed by Scholastic Inc.

The **whole-school intervention** is called the Memphis Content Literacy Academy (MCLA). It is a professional development model.

- Teachers in the four treatment schools will receive MCLA professional development for two years (Years 1 and 2).
- In Years 3 and 4, teachers in the four control schools will receive MCLA professional development.
- The evaluation of the impact of the whole-school intervention on students will utilize student-level data from Years 1 and 2 to contrast results for students in treatment schools to results for students in control schools.
- Impact of the whole-school intervention on instruction will be estimated using data from teacher surveys and classroom observations.
- Fidelity of instruction to treatment model will be assessed using an innovation configuration (IC) map to systematically classify classroom observation data.

2. Evaluation Design for Targeted Intervention

2.1. Description of Targeted Intervention and Control Conditions

The targeted intervention is Read 180. Read 180 will be delivered in place of regular language arts instruction to eligible students randomly assigned to the treatment group. Eligible students not selected for the targeted intervention will receive regular language arts instruction. In addition (depending upon the particular school), supplemental reading instruction may also be offered to students assigned to the control group.

2.2. Targeted Intervention: Impacts on Student Outcomes

2.2.1. Research Questions

Two of the three overarching research questions in the RED concern impacts on student outcomes as a result of the Read 180 targeted intervention:

- “What are the separate and combined effects of MCLA and Read 180 on reading achievement levels?” [RED, p. 10]
- “What are the separate and combined effects of MCLA and Read 180 on the achievement of students in participating schools in core subjects, especially students who are identified as struggling readers?” [RED, p. 10]

The general idea behind these two questions is that both interventions may have a positive impact on student performance on the ITBS reading subtests and all four subject area assessments of the TCAP. While the MCLA professional development may improve the reading and subject area achievement of all students in each MCLA school, the potential impact of Read 180 is restricted to struggling readers (students scoring in the lowest quartile on the TCAP reading/language arts assessment).

However, the joint impact of both interventions on the struggling readers is also of interest. The two interventions may simply be additive. Read 180 may have the same impact on the reading and subject area achievement of struggling readers in the MCLA schools as it has in the non-MCLA schools since all struggling readers (treatment and control) presumably will receive the same benefits of literacy instruction in core subject areas. On the other hand, the two interventions may have an interactive effect. The MCLA professional development may mask or enhance the Read 180 impact on struggling readers.

The impact of the Read 180 intervention (and its interaction with MCLA) may also be moderated by a variety of school, teacher, and student characteristics (e.g., school enrollment or poverty level, teacher experience or knowledge/use of research-based literacy strategies, student gender or grade level). In addition, the impact of the Read 180 intervention (and its interaction with MCLA) may vary from year to year. This may be due, for example, to improvements in the interventions or to the accumulation of impacts over time.

The following revised research questions are intended to address these possible variations in the impact of Read 180 and MCLA on the reading and subject area achievement of struggling readers and will guide the analyses of student achievement data:

1. What is the impact of Read 180 on the reading and subject area achievement of struggling readers, and is there a different impact in schools where teachers have received the MCLA professional development?
2. What is the joint impact of Read 180 and MCLA on the reading and subject area achievement of struggling readers, and does this impact vary depending on school, teacher, and student characteristics?
3. Does the joint impact of Read 180 and MCLA on the reading and subject area achievement of struggling readers vary over the four project years, and how much of this variation is explained by the amount of time students have received Read 180 services and been enrolled in MCLA schools?

2.2.2. Sampling Plan

A brief overview of the design for the evaluation of the targeted intervention on student outcomes follows.

2.2.2.1. Student-level or School-level Random Assignment

At the beginning of the 2006-07 school year, students who were eligible to receive Read 180 services were identified for each grade in each participating school. Within each grade at each school, 40 students were randomly selected from this eligible pool to receive Read 180 services. These 40 students were assigned by the school to one of two (except in two schools, which had three) Read 180 classes of approximately 20 students in each grade. The students who were not randomly selected to receive Read 180 services were placed in the control group.

In Years 2-4, eligible 6th grade students will be identified and 40 students will be randomly selected to receive Read 180 services. For the 7th and 8th grades in Years 2-4, each school is expected to have some open “slots” in Read 180 classes at the beginning of the school year. These slots will be filled for each grade in each school by identifying any new eligible students, combining these students with the existing control students, and randomly selecting enough students from this combined eligible pool to fill the empty slots.

2.2.2.2. Eligibility Criteria

To be eligible for Read 180 services, students must have scored in the lowest quartile of the TCAP reading/language arts assessment administered in the spring of the previous school year and must not have received Read 180 services in the past two years.

2.2.2.3. Cross-sectional Components

Cross-sectional analyses of student achievement in reading and the core subject areas will be conducted at the end of each year to assess the effects of Read 180 on achievement during that year. These analyses should be relatively straightforward at the end of Year 1 and for 6th grade students at the end of Years 2-4. Cross-sectional analyses for students in 7th grade and above may be more challenging to implement due to the presence of time-varying covariates at the student, teacher, and school levels of the analyses (e.g., amount of Read 180 instruction, changes in teachers and teacher experience/knowledge, and changing school enrollments and poverty levels). Longitudinal analysis models should be more appropriate for these situations.

2.2.2.4. Longitudinal Components

Longitudinal analyses of student achievement in reading and the core subject areas will be conducted at the end of Years 2-4 to assess the effects of Read 180 on changes in achievement across years. Longitudinal models will also allow the inclusion of time-varying covariates (most especially variations in the amount of Read 180 services received). Individual students will be tracked over the four years of the study. Any students randomly selected to receive Read 180 services will belong to the treatment group beginning the year they are selected. Eligible students will belong to the control group until they are randomly selected to receive Read 180 services.

“Based on mobility data from past school years, MCS projects the attrition rate (primarily a function of mobility) in a middle school to be approximately 30% for students and to be 20% for teachers. MCS has in place a data tracking system that will enable evaluators to obtain achievement data for students as long as they remain in the system.” [Source: RED, p. 19]

“The Read 180 treatment and control students in Years 1-3 will be included in the study as they matriculate into high school during Years 2 through 4. That is, they will be tracked, and their performance on the Tennessee Gateway assessments in English, mathematics, and science will be analyzed.” [Source: RED, p. 4]

2.2.2.5. Expected Sample Sizes

In Year 1, there are expected to be 40 treatment students and an average of 60 control students per grade. (School enrollments vary, and the number of eligible students is inversely related to grade level.) The treatment will be delivered in grades 6, 7, and 8 in eight schools, which yields 960 treatment and 1,440 control students. The plan assumes 30 percent attrition per year. A new influx of eligible 6th graders will be randomly assigned each year, with 40 assigned to treatment and an average of 60 assigned to the control group. Based on attrition and new 6th grade students, it is estimated that there will be 992 treatment and 1,488 control students in Year 2, 1,014 treatment and 1,522 control students in Year 3, and 1,030 treatment and 1,546 control students in Year 4.

2.2.3. Data Collection

The table below summarizes the data collection schedule for student-level measures.

Data Collection Schedule	
Academic Year	Intervention Student Measures
2005-06	TCAP scores in reading, math, social studies and science (Spring)
2006-07	ITBS reading scores (Fall and Spring) TCAP scores in reading, math, social studies and science (Spring)
2007-08	ITBS* reading scores (Spring) TCAP scores in reading, math, social studies and science (Spring) Gateway scores in English, math and science (Spring)
2008-09	ITBS* reading scores (Spring) TCAP scores in reading, math, social studies and science (Spring) Gateway scores in English, math and science (Spring)
2009-10	ITBS* reading scores (Spring) TCAP scores in reading, math, social studies and science (Spring) Gateway scores in English, math and science (Spring)

* Note: The ITBS is administered in the fall to sixth grade students only.

2.2.4. Statistical Analysis

Data analyses designed to answer the three revised research questions presented above will be based primarily on two- and three-level hierarchical linear models, where occasions, students, teachers, and/or schools will constitute the different levels of data. The separate and combined impacts of Read 180 and the MCLA whole-school intervention will be estimated within a single model. Due to the small number of schools, single-level models (ANOVA, ANCOVA, and OLS regression) will also be considered for estimating the impact of MCLA in order to improve statistical power.

2.2.4.1. Dependent Variables (Outcomes)

The dependent variables for analyses of the impacts of Read 180 and MCLA on students are the ITBS (to measure reading), and TCAP (to measure reading/language arts, math, social studies, and science). ITBS analyses will focus on the total reading score, although the use of vocabulary and comprehension subtest scores will be explored. Scale scores and NCEs will be used for the ITBS. Scale scores and performance levels will be used for the TCAP.

2.2.4.2. Independent Variables

A variety of covariates at each level of the analysis models will be included to (1) test the treatment effects, (2) identify significant moderator variables that interact with the treatment effects, and (3) control variation in the dependent variables. The same variables may appear as both moderator and control variables, the former being included as an interaction with the treatment variable. At the student level, examples include gender, baseline test scores, disability, and poverty. At the teacher level, examples include teacher knowledge, experience, and highest degree. Possible school-level control/moderator variables include average performance on the TCAP or ITBS and enrollment size.

2.2.4.3. Model Specifications

Cross-sectional Model

Multi-level regression analysis models will be used at the end of Year 1 to estimate and test the statistical significance of the difference between the reading and subject area achievement of students receiving Read 180 and the control group. Two-level models will express the spring 2007 ITBS and

TCAP scores as a function of student and school variables. The inclusion of teacher variables in three-level models will be investigated, probably using the reading/language arts teacher in analyses of the ITBS, and the TCAP reading/language arts scores and the corresponding content area teacher in analyses of the other TCAP subject area scores. The Read 180 treatment variable will be included at the student level of the models. Covariates at the student level will include the fall pretest scores on the ITBS and the previous year's TCAP scores, gender, disability, and poverty. Covariates representing the interaction of these variables with the treatment variable will be included to test whether these variables moderate the treatment effect. The MCLA treatment variable will be included at the school level, and the cross-level interaction with the Read 180 treatment effect will be used to test whether the Read 180 treatment effect is moderated by the presence of the MCLA professional development. If the cross-level interaction effect size is fairly large (e.g., more than 0.5), but statistically insignificant, additional single-level analyses of student-level data will be carried out to obtain an increase in statistical power (at the risk of underestimating error variance due to within-school cluster effects). These analyses will be repeated for 6th grade students in Years 2-4 as well as for the combined results for 6th grade students over the four years.

As an example of an analysis designed to test the Year 1 effects of the Read 180 and MCLA treatments on spring test scores (ITBS/TCAP) of struggling readers in the eight participating middle schools controlling for baseline test scores, consider the following two-level model:

$$Y_{ij} = \beta_{0j} + \beta_{1j}X_{1ij} + \beta_{2j}X_{2ij} + r_{ij}, \quad [1-1]$$

where

Y_{ij} is the Spring Year 1 test score (ITBS/TCAP) for student i in school j ;

X_{1ij} is an uncentered dummy variable coded 0 for Read 180 control and 1 for Read 180 treatment students in school j ;

X_{2ij} is a grand mean centered baseline test score (ITBS/TCAP) for student i in school j ;

β_{0j} is the (adjusted) mean Year 1 test score, controlling for the baseline test score, for all struggling readers in school j ;

β_{1j} is the (adjusted) difference between Read 180 treatment and control group means (the Read 180 treatment effect, controlling for the baseline test score) in school j ;

β_{2j} is the slope of the regression of Year 1 test scores on baseline test scores in school j ;

r_{ij} is a unique effect (error) for student i in school j and is $\sim N(0, \sigma^2)$;

and

$$\beta_{0j} = \gamma_{00} + \gamma_{01}W_j + u_{0j} \quad [1-2a]$$

$$\beta_{1j} = \gamma_{10} + \gamma_{11}W_j \quad [1-2b]$$

$$\beta_{2j} = \gamma_{20}, \quad [1-2c]$$

where

W_j is an uncentered dummy variable coded 0 for MCLA control and 1 for MCLA treatment schools;

γ_{00} is the grand mean Year 1 test score for all struggling readers;

γ_{01} is the difference between MCLA treatment and control school means (the MCLA treatment effect);
 γ_{10} is the average Read 180 treatment effect;
 γ_{11} is the difference between average Read 180 treatment effects in MCLA control and treatment schools (the cross-level interaction between Read 180 and MCLA treatments);
 γ_{20} is the average slope of the regression of Year 1 test scores on baseline test scores; and
 u_{0j} is the unique effect (error) of school j and is $\sim N(0, \tau)$.

The null hypothesis of no MCLA treatment effect on Year 1 test scores is $H_0: \gamma_{01} = 0$ and is tested with a t -statistic. Similarly, the interaction of MCLA and Read 180 treatments would have $H_0: \gamma_{11} = 0$, and the “main effect” for the Read 180 treatment would involve testing $H_0: \gamma_{10} = 0$. In the presence of a significant interaction, care would be taken in interpreting the average Read 180 effect over all schools.

Longitudinal Model

Multi-level regression models will also be used at the end of Years 2-4 to estimate and test the statistical significance of the difference between the growth in reading and subject area achievement of students receiving Read 180 and the control group. Three-level models will express ITBS and TCAP scores as a function of time, student, and school variables, or as a function of time, student, and teacher variables. (The examination of the Read 180-MCLA interaction can be omitted with the inclusion of teacher variables that should reasonably represent the impact of the MCLA professional development.) These longitudinal or growth models will also allow the inclusion of time-varying covariates in the time level component of the models.

As an example of an analysis designed to test the effects of the Read 180 and MCLA treatments on the growth of the spring test scores (ITBS/TCAP) of struggling readers in the eight participating middle schools over the first two years of the study, consider the following three-level model:

$$Y_{tij} = \pi_{0ij} + \pi_{1ij}A_{1tij} + \pi_{2ij}A_{2tij} + e_{tij}, \quad [2-1]$$

where

Y_{tij} is the Spring test score (ITBS/TCAP) in Year t for student i in school j ;
 A_{1tij} is an uncentered dummy variable coded 0 for baseline test scores (Fall/Spring 2006) and 1 for test scores in Years 1 and 2 (Spring 2007 and 2008) for student i in school j ;
 A_{2tij} is an uncentered dummy variable coded 0 for baseline and Year 1 test scores and 1 for test scores in Year 2 for student i in school j ;
 π_{0ij} is the baseline year test score of student i in school j ;
 π_{1ij} is the Year 1 change in the test score of student i in school j ;
 π_{2ij} is the Year 2 change in the test score of student i in school j ;
 e_{tij} is the unique effect (error) of Year t for student i in school j and is $\sim N(0, \sigma^2)$;

and

$$\pi_{0ij} = \beta_{00j} + r_{0ij} \quad [2-2a]$$

$$\pi_{1ij} = \beta_{10j} + \beta_{11j}X_{ij} + r_{1ij} \quad [2-2b]$$

$$\pi_{2ij} = \beta_{20j} + \beta_{21j}X_{ij} + r_{1ij}, \quad [2-2c]$$

where

X_{ij} is an uncentered dummy variable coded 0 for Read 180 control and 1 for Read 180 treatment students in school j ;

β_{00j} is the average baseline test score in school j ;

β_{01j} (not shown in [2-2a]) is the difference between the average baseline year test score for Read 180 treatment and control students in school j and is assumed to be zero in this model;

β_{10j} is the average Year 1 change in test scores in school j ;

β_{11j} is the difference between the average Year 1 change in test scores for Read 180 treatment and control students in school j (the Read 180 treatment effect on Year 1 growth in school j);

β_{20j} is the average Year 2 change in test scores in school j ;

β_{21j} is the difference between the average Year 2 change in test scores for Read 180 treatment and control students in school j (the Read 180 treatment effect on Year 2 growth j);

r_{0ij} , r_{1ij} , and r_{2ij} are the unique effects (error) of student i in school j on baseline test scores and growth in Years 1 and 2, respectively, and have a multivariate normal distribution with a mean of 0 and a covariance structure, \mathbf{T} ;

and

$$\beta_{00j} = \gamma_{000} + \gamma_{001}W_j + u_{00j} \quad [2-3a]$$

$$\beta_{10j} = \gamma_{100} + \gamma_{101}W_j \quad [2-3b]$$

$$\beta_{11j} = \gamma_{110} + \gamma_{111}W_j \quad [2-3c]$$

$$\beta_{20j} = \gamma_{200} + \gamma_{201}W_j \quad [2-3d]$$

$$\beta_{21j} = \gamma_{210} + \gamma_{211}W_j, \quad [2-3e]$$

where

W_j is an uncentered dummy variable coded 0 for MCLA control and 1 for MCLA treatment schools;

γ_{000} is the grand mean test score for all struggling readers;

γ_{001} is the difference between MCLA treatment and control school means (the MCLA treatment effect);

γ_{100} is the average Year 1 change in test scores;

γ_{101} is the difference between the average Year 1 change in test scores in MCLA treatment and control schools (the “main effect” of MCLA on Year 1 growth);

γ_{110} is the average Read 180 treatment effect on Year 1 growth;

γ_{111} is the difference between the average Read 180 treatment effect on Year 1 growth in MCLA treatment and control schools (the cross-level interaction effect between Read 180 and MCLA treatments on Year 1 growth);

γ_{200} is the average Year 2 change in test scores;

γ_{201} is the difference between the average Year 2 change in test scores in MCLA treatment and control schools (the “main effect” of MCLA on Year 2 growth);

γ_{210} is the average Read 180 treatment effect on Year 2 growth;

γ_{211} is the difference between the average Read 180 treatment effect on Year 2 growth in MCAL treatment and control schools (the cross-level interaction effect between Read 180 and MCLA treatments on Year 2 growth); and u_{00j} is the unique effect (error) of school j and is $\sim N(0, \tau_\beta)$.

The null hypothesis of no MCLA treatment effect on Year 1 change in test scores is $H_0: \gamma_{101} = 0$ and is tested with a t -statistic. Similarly, the interaction effect of MCLA and Read 180 treatments on Year 1 growth would have $H_0: \gamma_{111} = 0$, and the “main effect” for the Read 180 treatment would involve testing $H_0: \gamma_{110} = 0$. The interaction effect of MCLA and Read 180 treatments on Year 2 growth would have $H_0: \gamma_{211} = 0$, and the “main effect” for the Read 180 treatment would involve testing $H_0: \gamma_{210} = 0$. Again, in the presence of significant interactions, care would be taken in interpreting the average Read 180 effect on annual growth for all schools.

Decision Rules for Inclusion/Exclusion of Covariates

There are different approaches to including/excluding covariates in multi-level regression, as there are in single-level regression analyses. The most conservative approach appears to be to specify as many covariates as possible, within the constraints of the evaluation’s logic model, available data collection methods, and available degrees of freedom (numbers of occasions, students, teachers, and schools), and include them all in any analyses, reporting all effects and noting which are statistically significant. Currently, this approach is planned for all analyses.

Treatment of Missing Data

The plan is to use list-wise deletion of cases with missing data for any variable included in a specific analysis model or procedure.

2.2.5. Power to Detect Effects

The evaluation design provides minimum detectable effects given the sample size constraints that exist. [Source: RED, p. 15]

Treatment effects are measured as the difference between average student ITBS or TCAP scores for students participating or not in Read 180, where this difference is adjusted for all covariates in the model.

Statistical Method = 2-level HLM
 Schools = 8
 Students w/in Schools = 300
 Significance Level = 0.05
 Intra-class Correlation = 0.05
 Covariate Correlation = 0.7
 Power = 0.8
 Minimum Detectable Effect Size = 0.43 (Read 180)

[Source: RED, p. 17 (students w/in schools = 300 as per top of page 16)]

Note regarding assumptions on intra-class correlation: “Since these eight schools are relatively homogeneous, it is reasonable to assume a relatively small intra-class correlation (ratio of school variance to total variance), say 0.05.” [Source: RED, p. 15]

Note regarding assumptions on covariate correlation: “Since there will be baseline measures for the teacher and student outcomes, we can also assume a modest total correlation among covariate and the dependent variables, say 0.7.” [Source: RED, p. 15]

2.3. Targeted Intervention: Impacts on Instruction (Treatment/Control Differences in Instruction)

The revised evaluation design does not include a plan for assessing impact of the targeted intervention on instruction. This section and related subsections are not applicable.

2.3.1. Research Questions

2.3.2. Sampling Plan

2.3.2.1. Eligibility Criteria

2.3.2.2. Cross-sectional Components

2.3.2.3. Longitudinal Components

2.3.2.4. Expected Sample Sizes

2.3.3. Statistical Analysis

2.3.3.1. Dependent Variables (Outcomes)

2.3.3.2. Independent Variables

2.3.3.3. Model Specifications

Cross-sectional Model

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Decision Rules for Inclusion/Exclusion of Covariates

Treatment of Missing Data

2.3.4. Power to Detect Effects

2.4. Targeted Intervention: Implementation of Treatment

2.4.1. Research Questions

“The implementation evaluation design for the Read 180 intervention addresses a similar set of research questions:

1. To what degree does the implemented Read 180 treatment match the intended program design?
2. What contextual district and school level factors may be influencing the implementation of the Read 180 program?
3. How does language arts instruction, especially any supplemental services, provided to the control students compare to the services provided to the students receiving Read 180 services?
4. Is the Read 180 intervention implemented differently in MCLA treatment schools than in MCLA control schools?”

[Source: RED, p. 9]

2.4.2. Description of Implementation Process

2.4.2.1. Data Collection Plan

Evaluators will collect classroom observation data from the 19 Read 180 classrooms housed within the eight research sites. In addition, evaluators will attend select monthly Read 180 network meetings and receive updates about Read 180 implementation from Scholastic’s consultants assigned to work with Memphis City Public Schools.

2.4.2.2. Analysis

Analysis will be limited to a description of processes related to implementation. It is the evaluator’s understanding of guidance provided by the Department via e-mail message on November 15, 2006 that our role does not include responsibility for conducting an implementation evaluation of the targeted intervention:

“The central role of the evaluators is to measure the impact of the SR program on student achievement on reading tests. In addition, the evaluators will collect data that describes fidelity of implementation, that is, the extent to which the intensive targeted and school-wide interventions were implemented ‘on model’ (the way their developers designed them to be implemented). The data on fidelity of implementation will provide a context for interpreting the results about the impact on students.”

2.4.3. Fidelity of Treatment to Model

2.4.3.1. Data Collection Plan

Evaluators will receive records from project staff providing details related to training attended by Read 180 teachers. To evaluate the fidelity of the targeted intervention, data will be collected from the 19 Read 180 classrooms using adapted draft protocols from Scholastic, the Read 180 developer, to assess how teachers are applying the program across the schools.” [Source: RED, p. 9] In addition, evaluation data will be compared to data collected and feedback provided by Scholastic to Memphis City Public Schools.

2.4.3.2. Analysis

See response to 2.4.2.2 above.

2.5. Targeted Intervention: Other Studies

The conduct of other related studies is not planned at this time.

3. Evaluation Design for Whole-School Intervention

3.1. Description of Whole-school Intervention and Control Conditions

The whole-school intervention is called the Memphis Content Literacy Academy (MCLA), a professional development model. Teachers in the four treatment schools get PD for two years (Year 1 and 2). In Years 3 and 4, the four control schools get MCLA professional development. [Source: RED, pp. 2-3] Memphis City Public Schools also offers cohorts of schools opportunities to send ambassadors to the district’s Comprehensive Literacy Program (CLP). Ambassadors attend three days of training in the use of 12 research-based literacy strategies for a total of 21 professional development hours. Ambassadors, in turn, host three 30-minute development sessions at their home site to share strategies with fellow teachers.

3.2. Whole-school Intervention: Impacts on Student Outcomes

3.2.1. Research Questions

Two of the three overarching research questions in the RED also concern impacts on student outcomes as a result of the MCLA whole-school intervention:

- “What are the separate and combined effects of MCLA and Read 180 on reading achievement levels?” [RED, p. 10]
- “What are the separate and combined effects of MCLA and Read 180 on the achievement of students in participating schools in core subjects, especially students who are identified as struggling readers?” [RED, p. 10]

While the potential impact of Read 180 is restricted to struggling readers (students scoring in the lowest quartile on the TCAP reading/language arts assessment), the MCLA professional development may improve the reading and subject area achievement of all students in each MCLA school.

“For the MCLA intervention, all students in the eight participating middle schools are included in the analysis, since the professional development activity is school wide and is expected to impact all core subject teachers and all students.” [Source: RED, p. 4]

The impact of the MCLA intervention may also be moderated by a variety of school, teacher, and student characteristics (e.g., school enrollment or poverty level, teacher experience or knowledge/use of research-based literacy strategies, student gender or grade level). In addition, the impact of the MCLA intervention may vary from year to year. The professional development is a two-year program, and teachers may improve each year.

The following revised research questions are intended to address these possible variations in the impact of MCLA on the reading and subject area achievement of all students and will guide the analyses of student achievement data:

1. What is the impact of MCLA on the reading and subject area achievement of students and does this impact vary depending on school, teacher, and student characteristics?
2. Does the impact of MCLA on the reading and subject area achievement of students vary over the four project years and how much of this variation is explained by the amount of time teachers have participated in MCLA?

3.2.2. Sampling Plan

The eight participating middle schools were grouped into pairs matched on the most recent TCAP scores in reading/language arts and mathematics. These schools were quite homogenous on other available characteristics, such as poverty level and percentage of LEP students and students with disabilities. One of the schools in each pair was randomly assigned to participate in MCLA for Years 1 and 2.

3.2.2.1. Eligibility Criteria

All students in treatment and control schools will be included in the study of impacts of MCLA on student outcomes. There are no exclusionary criteria listed in the RED.

3.2.2.2. Cross-sectional Components

Cross-sectional analyses of student achievement in reading and the core subject areas will be conducted at the end of each year to assess the effects of MCLA on achievement during that year. These analyses should be relatively straightforward at the end of Year 1 and for 6th grade students at the end of Years 2-4. Cross-sectional analyses for students in 7th grade and above may be more challenging to implement due to the presence of time-varying covariates (e.g., changing school enrollments and poverty levels). Longitudinal analysis models should be more appropriate for these situations.

3.2.2.3. Longitudinal Components

Longitudinal analyses of student achievement in reading and the core subject areas will be conducted at the end of Years 2-4 to assess the effects of MCLA on changes in achievement across years. Individual students will be tracked over the four years of the study.

“Based on mobility data from past school years, MCS projects the attrition rate (primarily a function of mobility) in a middle school to be approximately 30% for students and to be 20% for teachers. MCS has in place a data tracking system that will enable evaluators to obtain achievement data for students as long as they remain in the system.” [Source: RED, p. 19]

3.2.2.4. Expected Sample Sizes

For whole-school impact on students, the RED indicates that the average number of students per school is 750 (about 250 per grade). [Source RED, p 5] Across the eight schools that comes to about 6,000 students in Year 1, or 3,000 MCLA treatment and 3,000 MCLA control students in Year 1. Based on attrition and new 6th grade students, it is estimated that there will be 6,200 students in Year 2, 6,340 students in Year 3, and 6,438 students in Year 4.

3.2.3. Data Collection

The table below summarizes the data collection schedule for student-level measures.

Data Collection Schedule	
Academic Year	Intervention Student Measures
2005-06	TCAP scores in reading, math, social studies and science (Spring)
2006-07	ITBS reading scores (Fall and Spring) TCAP scores in reading, math, social studies and science (Spring)
2007-08	ITBS* reading scores (Spring) TCAP scores in reading, math, social studies and science (Spring) Gateway scores in English, math and science (Spring)
2008-09	ITBS* reading scores (Spring) TCAP scores in reading, math, social studies and science (Spring) Gateway scores in English, math and science (Spring)
2009-10	ITBS* reading scores (Spring) TCAP scores in reading, math, social studies and science (Spring) Gateway scores in English, math and science (Spring)

* Note: The ITBS is administered in the fall to sixth grade students only.

3.2.4. Statistical Analysis

Data analyses designed to answer the two revised research questions presented above will be based primarily on two- and three-level hierarchical linear models, where occasions, students, teachers, and/or schools will constitute the different levels of data. Due to the small number of schools, single-level models (ANOVA, ANCOVA, and OLS regression) will also be considered for estimating the impact of MCLA in order to improve statistical power.

3.2.4.1. *Dependent Variables (Outcomes)*

The dependent variables for analyses of the impact of MCLA on students are the ITBS (to measure reading), and TCAP (to measure reading/language arts, math, social studies, and science). ITBS analyses will focus on the total reading score, although the use of vocabulary and comprehension subtest scores will be explored. Scale scores and NCEs will be used for the ITBS. Scale scores and performance levels will be used for the TCAP.

3.2.4.2. *Independent Variables*

A variety of covariates at each level of the analysis models will be included to (1) test the treatment effect, (2) identify significant moderator variables that interact with the treatment effect, and (3) control variation in the dependent variables. The same variables may appear as both moderator and control variables, the former being included as an interaction with the treatment variable. At the student level, examples include gender, baseline test scores, disability, and poverty. At the teacher level, examples include teacher knowledge, experience, and highest degree. Possible school-level control/moderator variables include average performance on the TCAP or ITBS and enrollment size.

3.2.4.3. *Model Specifications*

Cross-sectional Model

Multi-level regression analysis models will be used at the end of Year 1 to estimate and test the statistical significance of the difference between the reading and subject area achievement of students in MCLA schools and students in non-MCLA schools. Two-level models will express the spring 2007 ITBS and TCAP scores as a function of student and school variables. The inclusion of teacher variables in three-level models will be investigated, probably using the reading/language arts teacher in analyses of the ITBS and the TCAP reading/language arts scores and the corresponding content area teacher in analyses of the other TCAP subject area scores. The MCLA treatment variable will be included at the school level of the models. Covariates at the student level will include the fall pretest scores on the ITBS and the previous year's TCAP scores, gender, disability, and poverty. Covariates representing the interaction of these variables with the treatment variable will be included to test whether these variables moderate the treatment effect. If the MCLA treatment effect size is fairly large (e.g., more than 0.5), but statistically insignificant, additional single-level analyses of student-level data will be carried out to obtain an increase in statistical power (at the risk of underestimating error variance due to within-school cluster effects). These analyses will be repeated for 6th grade students in Years 2-4 as well as for the combined results for 6th grade students over the four years.

As an example of an analysis designed to test the Year 1 effects of the MCLA treatment on spring test scores (ITBS/TCAP) of all students in the eight participating middle schools controlling for baseline test scores, consider the following two-level model:

$$Y_{ij} = \beta_{0j} + \beta_{1j}X_{ij} + r_{ij}, \quad [3-1]$$

where

Y_{ij} is the Spring Year 1 test score (ITBS/TCAP) for student i in school j ;

X_{ij} is a grand mean centered baseline test score (ITBS/TCAP) for student i in school j ;

β_{0j} is the (adjusted) mean test score, controlling for the baseline test score, for all students in school j ;

β_{1j} is the slope of the regression of Year 1 test scores on baseline test scores in school j ;

r_{ij} is a unique effect (error) for student i in school j and is $\sim N(0, \sigma^2)$;

and

$$\beta_{0j} = \gamma_{00} + \gamma_{01}W_j + u_{0j} \quad [3-2a]$$

$$\beta_{1j} = \gamma_{10}, \quad [3-2b]$$

where

W_j is an uncentered dummy variable coded 0 for MCLA control and 1 for MCLA treatment schools;

γ_{00} is the grand mean test score for all students;

γ_{01} is the difference between MCLA treatment and control school means (the MCLA treatment effect);

γ_{10} is the average slope of the regression of Year 1 test scores on baseline test scores; and

u_{0j} is the unique effect (error) of school j and is $\sim N(0, \tau)$.

The null hypothesis of no MCLA treatment effect on Year 1 test scores is $H_0: \gamma_{01} = 0$ and is tested with a t -statistic.

Longitudinal Model

Multi-level regression models will also be used at the end of Years 2-4 to estimate and test the statistical significance of the difference between the growth in reading and subject area achievement of students in MCLA schools and students in non-MCLA schools. (In Years 3 and 4, the comparison will actually be between students in schools with varying amounts of MCLA professional development and time to build on what was learned.) Three-level models will express ITBS and TCAP scores as a function of time, student, and school variables, or as a function of time, student, and teacher variables.

As an example of an analysis designed to test the effects of the MCLA treatment on the growth of the spring test scores (ITBS/TCAP) of all students in the eight participating middle schools over the first two years of the study, consider the following three-level model:

$$Y_{tij} = \pi_{0ij} + \pi_{1ij}A_{1tij} + \pi_{2ij}A_{2tij} + e_{tij}, \quad [4-1]$$

where

Y_{tij} is the Spring test score (ITBS/TCAP) in Year t for student i in school j ;

A_{1tij} is an uncentered dummy variable coded 0 for baseline test scores (Fall/Spring 2006) and 1 for test scores in Years 1 and 2 (Spring 2007 and 2008) for student i in school j ;

A_{2tij} is an uncentered dummy variable coded 0 for baseline and Year 1 test scores and 1 for test scores in Year 2 for student i in school j ;

π_{0ij} is the baseline year test score of student i in school j ;

π_{1ij} is the Year 1 change in the test score of student i in school j ;
 π_{2ij} is the Year 2 change in the test score of student i in school j ;
 e_{tij} is the unique effect (error) of Year t for student i in school j and is $\sim N(0, \sigma^2)$;

and

$$\pi_{0ij} = \beta_{00j} + r_{0ij} \quad [4-2a]$$

$$\pi_{1ij} = \beta_{10j} + r_{1ij} \quad [4-2b]$$

$$\pi_{2ij} = \beta_{20j} + r_{2ij}, \quad [4-2c]$$

where

β_{00j} is the average baseline test score in school j ;

β_{10j} is the average Year 1 change in test scores in school j ;

β_{20j} is the average Year 2 change in test scores in school j ;

r_{0ij} , r_{1ij} , and r_{2ij} are the unique effects (error) of student i in school j on baseline test scores and growth in Years 1 and 2, respectively, and have a multivariate normal distribution with a mean of 0 and a covariance structure, \mathbf{T} ;

and

$$\beta_{00j} = \gamma_{000} + u_{00j} \quad [4-3a]$$

$$\beta_{10j} = \gamma_{100} + \gamma_{101} W_j \quad [4-3b]$$

$$\beta_{20j} = \gamma_{200} + \gamma_{201} W_j \quad [4-3c]$$

where

W_j is an uncentered dummy variable coded 0 for MCLA control and 1 for MCLA treatment schools;

γ_{000} is the grand mean test score for all struggling readers;

γ_{001} (not shown in [2-3a]) is the difference between MCLA treatment and control school baseline test score means (assumed to be zero in this model);

γ_{100} is the average Year 1 change in test scores;

γ_{101} is the difference between the average Year 1 change in test scores in MCLA treatment and control schools (the effect of MCLA on Year 1 growth);

γ_{200} is the average Year 2 change in test scores;

γ_{201} is the difference between the average Year 2 change in test scores in MCLA treatment and control schools (the effect of MCLA on Year 2 growth); and

u_{00j} is the unique effect (error) of school j and is $\sim N(0, \tau_\beta)$.

The null hypothesis of no MCLA treatment effect on Year 1 change in test scores is $H_0: \gamma_{101} = 0$ and is tested with a t -statistic. Similarly, the null hypothesis for the MCLA effect on Year 2 growth is $H_0: \gamma_{201} = 0$.

Decision Rules for Inclusion/Exclusion of Covariates

There are different approaches to including/excluding covariates in multi-level regression as there are in single-level regression analyses. The most conservative approach appears to be to specify as many covariates as possible, within the constraints of the evaluation's logic model, available data collection methods, and available degrees of freedom (numbers of occasions, students, teachers, and schools), and include them all in any analyses, reporting all effects and noting which are statistically significant. Currently, this approach is planned for all analyses.

Treatment of Missing Data

The plan is to use list-wise deletion of cases with missing data for any variable included in a specific analysis model or procedure.

3.2.5. Power to Detect Effects

The evaluation design provides minimum detectable effects given the sample size constraints that exist. [Source: RED, p. 15]

Treatment effects are measured as the difference between average student ITBS or TCAP scores for students in MCLA schools and non-MCLA schools, where this difference is adjusted for all covariates in the model.

Statistical Method = 2-level HLM
 Schools = 8
 Students w/in Schools = 750
 Significance Level = 0.05
 Intra-class Correlation = 0.05
 Covariate Correlation = 0.7
 Power = 0.8
 Minimum Detectable Effect Size = 0.41 (MCLA)"

[Source: RED, p. 17]

3.3. Whole-school Intervention: Impacts on Instruction (Treatment/Control Differences in Instruction)

3.3.1. Research Questions

The third overarching research question in the RED concerns impacts on teacher/instructional outcomes as a result of the MCLA whole-school intervention:

- “What is effect of the MCLA program on the research-based reading instruction and practice of core subject teachers in participating middle schools?” [Source: RED, p. 10]

3.3.2. Sampling Plan

The selection of schools for the MCLA whole-school intervention is described section 3.2.2

3.3.2.1. Eligibility Criteria

All teachers of core subject areas (language arts, mathematics, social studies, and science) were invited to participate in this two-year professional development program.

3.3.2.2. Cross-sectional Components

Cross-sectional analyses of teacher knowledge and practice will be conducted at the end of each year to assess the effects of MCLA during that year. Although these analyses should be relatively straightforward at the end of Year 1, they will be more difficult to implement and interpret in Years 2-4 due to the presence of time-varying covariates. Longitudinal analysis models should be more appropriate for these situations.

3.3.2.3. Longitudinal Components

Longitudinal analyses of teacher knowledge and practice will be conducted at the end of Years 2-4 to assess the effects of MCLA on changes in teacher outcomes across years. Individual teachers will be tracked over the four years of the study.

3.3.2.4. Expected Sample Sizes

There will be four treatment and four control schools, with 30 teachers per school. [Source: RED, p. 17]. This will yield 120 teachers in treatment schools and 120 teachers in control schools each year.

3.3.3. Data Collection

Data Collection Schedule	
Academic Year	Intervention Teacher Measures
2006-07	24-item teacher survey (Fall and Spring) Classroom observations (Three times per year)
2007-08	24-item teacher survey (Spring) Classroom observations (Three times per year)
2008-09	24-item teacher survey (Fall and Spring) Classroom observations (Three times per year)
2009-10	24-item teacher survey (Spring) Classroom observations (Three times per year)

*Note: It is likely to be the case that during 2006-2007, there will be one round of classroom observations. In subsequent years it is expected that two rounds of classroom observations will be conducted.

Section 3.4 below (on fidelity of implementation) describes the Innovation Configuration Map. “Part of the Innovation Configuration Map will be integrated into a survey for teachers of core subjects in the treatment and control schools to assess their knowledge and use of research-based reading principles and strategies. These results will be used in the evaluation of the impact of the MCLA program on teacher practice, discussed later.” [Source: RED, page 7]

3.3.4. Statistical Analysis

Data analyses designed to answer the research question presented above will be based primarily on two- and three-level hierarchical linear models, where occasions, teachers, and schools will constitute the different levels of data.

3.3.4.1. *Dependent Variables (Outcomes)*

“Teacher knowledge and practice of research-based reading instruction will be assessed by **teacher surveys** administered in the fall of 2006 and the spring of 2007 through 2010 (Years 1-4 of the study).” [Source: RED, p. 11] This 24-item survey was developed to assess teacher preparedness and experience using the strategies that are central to MCLA model. [Source: RED, p. 11]

“**Classroom observations** will be made three times annually (in the beginning, middle, and end of the school year) in Years 1-4.” Classroom observations will use observation tools based on an Innovation Configuration Map. [Source: RED, p. 11]

3.3.4.2. *Independent Variables*

A variety of covariates at each level of the analysis models will be included to (1) test the treatment effect, (2) identify significant moderator variables that interact with the treatment effect, and (3) control variation in the dependent variables. The same variables may appear as both moderator and control variables, the former being included as an interaction with the treatment variable. At the teacher level, examples include experience, certification, highest degree, and baseline survey scores. Possible school-level control/moderator variables include average performance on the TCAP or ITBS and enrollment size.

3.3.4.3. *Model Specifications*

Cross-sectional Model

Multi-level regression analysis models will be used at the end of Year 1 to estimate and test the statistical significance of the difference between the knowledge and practice of teachers in MCLA schools and teacher in non-MCLA schools. Two-level models will express the spring teacher survey results as a function of teacher and school variables. The MCLA treatment variable will be included at the school level of the models. Covariates at the teacher level will act as control variables in the analysis. Covariates representing the interaction of these variables with the treatment variable will be included to test whether these variables moderate the treatment effect.

The sample model provided for analyzing the effect of the MCLA treatment on student Spring Year 1 test scores (see equations 3.1 and 3.2) could also be employed to analyze the effect of the MCLA treatment on dependent variables representing teacher knowledge and practice of research-based reading instruction.

Longitudinal Model

Multi-level regression models will also be used at the end of Years 2-4 to estimate and test the statistical significance of the difference between the growth in knowledge and practice of teachers in MCLA schools and teachers in non-MCLA schools. (In Years 3 and 4, the comparison will actually

be between teachers in schools with varying amounts of MCLA professional development and time to build on what was learned.) Three-level models will express teacher survey and observation results as a function of time, teacher, and school variables.

The sample model provided for analyzing the effect of the MCLA treatment on changes in student test scores over the first two years of the study (see equations 4.1, 4.2, and 4.3) could also be employed to analyze the effect of the MCLA treatment on dependent variables representing teacher knowledge and practice of research-based reading instruction.

Decision Rules for Inclusion/Exclusion of Covariates

There are different approaches to including/excluding covariates in multi-level regression as there are in single-level regression analyses. The most conservative approach appears to be to specify as many covariates as possible, within the constraints of the evaluation's logic model, available data collection methods, and available degrees of freedom (numbers of occasions, students, teachers, and schools), and include them all in any analyses, reporting all effects and noting which are statistically significant. Currently, this approach is planned for all analyses.

Treatment of Missing Data

The plan is to use list-wise deletion of cases with missing data for any variable included in a specific analysis model or procedure.

3.3.5. Power to Detect Effects

The evaluation design provides minimum detectable effects given the sample size constraints that exist. [Source: RED, p. 15]

Treatment effects are measured as the “difference between average teacher knowledge and practice measures for teachers in MCLA and non-MCLA schools,” where this difference is adjusted for all covariates in the model.

Statistical Method = 2-level HLM
Schools = 8
Teachers w/in Schools = 30
Significance Level = 0.05
Intra-class Correlation = 0.05
Covariate Correlation = 0.7
Power = 0.8
Minimum Detectable Effect Size = 0.6”

[Source: RED, p. 17]

3.4. Whole-school Intervention: Implementation of Treatment

3.4.1. Research Questions

“Memphis Content Literacy Academy (MCLA). **The implementation evaluation design for the MCLA program** addresses the following research questions:

1. To what degree does the implemented MCLA treatment match the intended program standards and features?
2. What contextual district and school level factors may be influencing the implementation of the MCLA program?

[Source: RED, p. 6]

3.4.2. Description of Implementation Process

“**Contextual Factors.** Interviews with school principals, central office staff, and members of the school improvement teams at the eight participating schools will be used to triangulate information regarding school practices and to provide an understanding of factors that may be influencing the implementation of the MCLA program at each school. In addition, the evaluators will collaborate with MCS officials to construct a profile for each of the eight schools participating in the project. The profile will include, but not be limited to: (1) summaries of student achievement at the school for the past five years; (2) teacher data for the past five years, including the number of teachers assigned the school, teacher turnover, number teaching out of field, number certificated, etc.; (3) administrator data for the past five years, including the number of administrators assigned to the school, administrator turnover, etc.; (4) description of the various programs that have been implemented in the school to improve student achievement over the past five years; (5) unique features associated with each school; and (6) other factors yet to be determined.

MCLA Treatment and Control Conditions. To describe and compare the professional development events, materials, and structures in the eight schools, surveys of teachers at both treatment and control schools will include questions about professional development opportunities, especially regarding the use of scientifically based reading research for improving students’ reading skills.

Analyses of results from the Innovation Configuration Map and the interviews and surveys of teachers’ professional development will include descriptive distributions and cross-tabulations by treatment and control schools where appropriate. MCLA program staff will periodically review these results to determine the need for changes in the program. Formative reports will be prepared and made available at the end of each semester. Additional analyses will be carried out to develop efficient methods for summarizing numerous and disparate sources of information about program implementation to create indices or other composite measures that can be included as school-level covariates in analyses of the impact of the program.”

[Source: RED, p. 8-9]

3.4.2.1. Data Collection Plan

See response above.

3.4.2.2. Analysis

See response above.

3.4.3. Fidelity of Treatment to Model

3.4.3.1. Data Collection Plan

“**Implementation Fidelity.** To address the first question, records will be kept of the courses offered to teachers, their syllabi, teacher attendance, coaching visits, and classroom action plans. Protocols will be used to observe sample trainings and participating teachers’ classrooms. To evaluate the fidelity of implementation of the MCLA program, an Innovation Configuration Map (Hall & Hord, 2001) will be developed in August 2006, prior to the commencement of implementation data collection. Innovation Configuration Maps, key features of the Concerns Based Adoption Model developed by Hall and Hord (2001), are constructed to identify major components of an innovation. From an evaluation perspective, the utility of the map is that it describes the observable variations of each component as it is being implemented. Once critical components of the MCLA are identified and their respective levels of implementation elucidated, the MCLA Innovation Configuration map will provide a means for measuring the level of implementation fidelity.

Dr. Gene Hall, one of the co-developers of the Concerns Based Adoption Model, will facilitate the creation of the MCLA Innovation Configuration map as part of this project. The development process took place on August 24-26, 2006 with Dr. Hall and the project research and evaluation staff at MCS. The intent was to develop the map and train evaluators in its use prior to the full implementation of the MCLA in fall of 2006. It will be used again the spring of 2007, fall of 2007, and spring of 2008.

The Innovation Configuration Map will also be used in conjunction with teacher classroom observations to assess teacher implementation of the instructional practices taught during MCLA.”
[Source: RED, page 6-7]

3.4.3.2. Analysis

(To be added.)

3.5. Whole-School Intervention: Other Studies

The conduct of other related studies is not planned at this time.

4. Special Issues or Concerns

There are no special issues or concerns to report at this time.

5. Reporting Schedule

The evaluation component will be included in the project's annual reports. In addition, there will be occasional interim analyses of evaluation data presented in reports to the project leadership, professional presentations, and displays on the RBS Web site at www.rbs.org.

6. Key Study Personnel and Contact Information

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