eMINTS 2009 Program Evaluation Report:

An analysis of the persistence of program impact on student achievement

Submitted by:

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Executive Summary

The eMINTS suite of professional development programs was created to help educators, administrators, and technology specialists understand how to integrate technology into a broader instructional approach that promotes inquiry-based learning, alternative assessment, and collaboration and community building among teachers and students. Between 2006 and 2008, Education Development Center, Inc.'s Center for Children and Technology (EDC/CCT) conducted an evaluation of two of the programs that eMINTS offers—eMINTS Comprehensive Professional Development (eMINTS Comp), a two-year program for teachers in school-designated grades, consisting of approximately 250 hours of teacher professional development and support, including 10–12 classroom visits each year; and eMINTS4ALL, a program developed for teachers in the grades above and below eMINTS Comp teachers, consisting of 90-hours of professional development over two years, including 8–9 classroom visits per year. The evaluation that was completed in 2008 focused on understanding whether the two programs were being implemented with fidelity to the core program goals, whether the level of program fidelity had an impact on teachers' mastery of the program concepts, and whether program fidelity and teacher mastery of concepts had an impact on student achievement.

As part of this evaluation, we collected different forms of data, including the following:

- Observational data from eMINTS professional development sessions to measure professional development (PD) fidelity
- Records of classroom visits by eMINTS instructional specialists to understand how much time they spent on different activities
- Teacher artifacts (lesson plans, WebQuests, and classroom websites) submitted as part of eMINTS teachers' portfolios to measure teacher mastery
- Student assessment data from the 2007 Missouri Assessment Program (MAP) tests in mathematics and communication arts to measure student achievement

Some key findings from the 2008 eMINTS evaluation included the following:

- Overall, the program was being implemented with a high level of fidelity.
- There was a significant, positive correlation between PD fidelity and teacher mastery scores on the lesson plans teachers submitted in their portfolios.
- There was a significant, positive correlation between the amount of time teachers spent on lesson planning during classroom visits and the scores on the lesson plans they submitted as part of their portfolios.

- There were significant, positive correlations between student MAP scores and teacher mastery on the lesson plan (in grades 3, 4, and 7), on the WebQuest (in grades 3 and 7), and on the classroom website (in grades 4, 5, and 7).
- There were significant, positive correlations between PD fidelity and student MAP scores in grades 3, 4, 5, and 8.
- There were significant, positive correlations between student MAP scores and time spent on lesson planning during classroom visits in grades 4, 5, and 8.

These findings provide evidence that the more closely aligned the local implementation of eMINTS is to core program goals, the greater the impact the program has on teachers' understanding of the material and on students' performance on standardized assessments. The eMINTS program staff wanted to know if these relationships persisted past the second year of the program, and to understand whether different amounts of student experience with eMINTS teachers over two years had any impact on their achievement levels. Thus, the questions that guided the second year of the eMINTS evaluation were the following:

1. What is the relationship between teacher mastery of eMINTS concepts and student achievement a year after teachers have completed the two-year professional development program?

2. What is the relationship between eMINTS PD fidelity and student achievement a year after teachers have completed the two-year professional development program?

3. Do students who have eMINTS teachers for two successive years perform better on standardized assessments than students who do not have eMINTS teachers at all?

4. Do students who have eMINTS teachers for two successive years perform better on standardized assessments than students who have eMINTS teachers for one year?

EDC/CCT evaluators obtained 2008 MAP assessment data from schools that had teachers who participated in the eMINTS program.[1] To answer questions 1 and 2, we conducted the same analyses looking at the relationships among program fidelity, teacher mastery, and student achievement, substituting the 2008 MAP data for the 2007 MAP data. We found that many of the patterns of impact persisted a year after teachers completed the program.

- In the third grade, the students of teachers who had higher teacher mastery scores on their lesson plans from the previous year continued to outperform those who had lower scores. Regressions showed that teacher mastery of lesson plans continued to be a significant predictor of student achievement in third grade.

1 Similar to the 2008 evaluation, all of the schools except one examined in this study paid for eMINTS programming with Title IID funds. These were the schools that made their teacher rosters available to us, which allowed us to match teachers to students.

- There continued to be a significant, positive correlation between the amount of time teachers spent on lesson planning during classroom visits and student MAP scores in the fourth and fifth grades and additionally the third-grade mathematics scores.
- We found significant correlations between PD fidelity and student achievement in fourth and fifth grades, and regressions showed that fidelity continued to be a significant predictor for fifth-grade student achievement.

To answer questions 3 and 4, we compared the achievement of students based on the amount of exposure to eMINTS teachers over two years and found the following:

- When comparing students having two years of eMINTS Comp teachers with students having two years of non-eMINTS teachers from fourth to fifth grade, having two years of eMINTS Comp teachers was a positive predictor of students' fifth-grade MAP communication arts scores.
- When comparing students having two years of eMINTS Comp teachers with students having two years of non-eMINTS teachers from fifth to sixth grade, having two years of eMINTS Comp teachers was found to be a positive predictor of students' sixth-grade MAP communication arts and mathematics scores.
- When comparing students having two years of eMINTS Comp teachers with students having one year of eMINTS Comp teachers from fifth to sixth grade, having two years of eMINTS Comp teachers was a positive predictor of students' sixth-grade MAP communication arts and mathematics scores. This was true for students having an eMINTS Comp teacher only in fifth grade and students having an eMINTS Comp teacher only in sixth grade. The students receiving one year of eMINTS Comp did not perform significantly better than the students with no eMINTS teachers in this analysis.

Over these two years of evaluation, our analyses have demonstrated consistent patterns of program impact. Mastery of program concepts, fidelity of professional development, and amount of time planning lessons during the visits from instructional specialists are all associated with higher levels of student achievement, and those relationships persist a year after these teachers have completed their two–year eMINTS professional development programs. In addition, this new set of analyses also suggests that students who have spent two years in the classrooms of eMINTS Comp teachers outperform their peers in the same schools who have less experience with these teachers. All of these analyses provide strong evidence that, when the program is delivered as intended, it can have a persistent positive impact on the students and teachers it reaches.

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Section I: Introduction

The eMINTS suite of professional development programs was created to help educators, administrators, and technology specialists understand how to integrate technology into a broader instructional approach that promotes inquiry-based learning, alternative assessment, and collaboration and community building among teachers and students. Begun in 1999 by educators at the University of Missouri to provide professional development to teachers in the state (it is an acronym for "enhancing Missouri's Instructional Networked Teaching Strategies"), eMINTS now reaches teachers in twelve states in the United States and one state in Australia. eMINTS consists of a number of different programs. Those considered in this paper include (1) eMINTS Comprehensive Professional Development (eMINTS Comp)—a two-year program for teachers in school-designated grades, consisting of approximately 250 hours of teacher professional development and support, including 10–12 classroom visits each year; and (2) eMINTS4ALL—a two-year program developed for teachers in the grades above and below eMINTS Comp teachers, consisting of 90 hours of professional development, including 10-12 classroom visits per year.

In 2006 Education Development Center, Inc.'s Center for Children and Technology (EDC/CCT) began an evaluation of the eMINTS program that was designed to examine the relationships among program fidelity, teacher mastery of program concepts, and student achievement, and to determine if the program had a lasting impact on participating teachers and their students. In this evaluation design, program fidelity consisted of two components:

1. PD fidelity: how well the professional development addressed the key conceptual constructs of eMINTS
2. Classroom visits: how much time instructional specialists spent on certain activities during their regular visits to participant classrooms

Teacher mastery of concepts was determined through an analysis of some of the key artifacts (a lesson plan, a WebQuest, and a classroom website) teacher participants submitted in their program portfolios at the end of their two-year professional development experience. Student achievement was determined through an analysis of Missouri Assessment Program (MAP) data in communication arts and mathematics. The MAP is Missouri's state standardized test, administered in the spring of each school year to public school students in grades 3–8.

The evaluation looked at the impact of the program over two years. The questions that guided the first year of evaluation were the following:

- Does the level of eMINTS program fidelity have an impact on participating teachers' mastery of the concepts presented in the professional development sessions?
- Does the level of eMINTS program fidelity have an impact on the achievement of students in the classrooms of eMINTS teachers?
- Does teachers' level of mastery of the program concepts have an impact on the achievement of students in their classrooms?

The questions that guided the second year of the evaluation were the following:

- What is the relationship between teacher mastery of eMINTS concepts and student achievement a year after teachers have completed the two-year professional development program?
- What is the relationship between eMINTS program fidelity and student achievement a year after teachers have completed the two-year professional development program?
- Do students who have eMINTS teachers for two successive years perform better on standardized assessments than students who have eMINTS teachers for one year?
- Do students who have eMINTS teachers for two successive years perform better on standardized assessments than students who do not have eMINTS teachers at all?

The evaluation took place in five stages. Stage 1 was EDC/CCT's development of evaluation instruments in collaboration with eMINTS program staff. Stage 2 was the collection of program data, including observations of PD sessions, collection of records from visits that instructional specialists made to participant teachers' classrooms, and collection of the participant teachers' portfolios. Stage 3 was the creation of a database containing all of these forms of data and the analysis of program data. Stage 4 was the collection and integration of student achievement data into the larger database and the analysis of those data in relation to the program data. Stage 5 was the collection and integration of a second year of student data and the analysis of those data in relation to the program data.

EDC/CCT researchers produced an evaluation report after Stage 4 that described in detail the evaluation process, including the development of instruments and collection of data, as well as the findings from our analyses of program fidelity, teacher mastery, and student achievement data (see Martin, Strother, Weatherholt & Dechaume, 2008). The program fidelity data came from observations of PD sessions, and classroom visit records of teachers from 55 Missouri school districts

and one Arkansas district. Teacher mastery data from teacher portfolios came from 32 of those districts, and student achievement data came from 11 of those districts.[2] Key findings from the 2008 evaluation report included the following:

- Overall, the program was being implemented with a high level of fidelity.
- There was a significant, positive correlation between PD fidelity and teacher mastery scores on the lesson plans teachers submitted in their portfolios.
- There was a significant, positive correlation between the amount of time teachers spent lesson planning during classroom visits and the scores on the lesson plans they submitted as part of their portfolios.
- There were significant, positive correlations between student MAP scores and teacher mastery on the lesson plan (in grades 3, 4, and 7), on the WebQuest (in grades 3 and 7), and on the classroom website (in grades 4, 5, and 7).
- There were significant, positive correlations between PD fidelity and student MAP scores in grades 3, 4, 5, and 8.
- There were significant, positive correlations between student MAP scores and time spent lesson planning during classroom visits in grades 4, 5, and 8.

Overall, the results of the 2008 evaluation suggested that program fidelity is important. High fidelity in the PD sessions was associated with both higher quality teacher lesson plans and higher student achievement. In addition, there were positive relationships between student achievement and teachers' level of mastery of program concepts, as well as the amount of time teachers spent planning lessons during the visits instructional specialists made to their classrooms.

The eMINTS program staff wanted to see if these patterns of program impact persisted a year after the teachers completed their eMINTS experience. EDC/CCT collected a second year of MAP data from 10 of the 11 districts that were included in the 2008 evaluation report. This set of data would enable us to do the following:

- Look at a second year of assessment information from students of eMINTS teachers to see if the relationships among program fidelity, teacher mastery, and student achievement were consistent with those found in the previous year

2 We were only able to obtain the student rosters of teachers who participated in eMINTS from the ten districts that received their eMINTS funding through Title IID grants and one additional district. Student rosters were necessary to match student achievement data to teacher eMINTS participation.

- Follow the students from the first analysis, see whether or not they had an eMINTS teacher in the second year, and see if there were differences in student achievement based on the amount of exposure they had to eMINTS teachers over two years

This report will provide an abbreviated description of the instruments along with a detailed description of the analyses that we conducted on the 2008 MAP data and the findings from these analyses. In Section II of this report, we describe the methods used to collect the evaluation data. In Section III, we describe the analyses that were conducted on the data and the creation of the comprehensive database. In Section IV, we present the findings from our analyses, and in Section V, we discuss the implications of the evaluation findings.

Section II: Methods

In this second round of analyses, EDC/CCT evaluators drew upon the program data obtained during the 2006–2007 school year (from PD observations, classroom visit records, and teacher portfolios) and examined the relationships among these data and student achievement data from the 2008 MAP assessment. Below we provide brief descriptions of the different data sources—how they are defined and how the data were collected. More detailed descriptions of the data sources and the development of instruments to collect those data can be found in the 2008 eMINTS Program Evaluation Report.

PARTICIPANTS

The current study is a continuation of last year's study. The participating eMINTS teachers remained the same, except those from one district, which did not provide updated rosters. Rosters and student data were collected for 250 teachers from last year's study, including 141 eMINTS teachers (see Table 1). MAP data were collected for third- to sixth-grade students from the 2008 MAP assessment and were merged with the 2006–2007 data from the previous study. In total, data were collected for 7,012 students from 10 districts including 35 schools (see Table 1).

Table 1: Number of students in the current study, with number of teachers, schools, and districts associated with those students.

Program Type	Number of Students	Number of Teachers	Number of Schools	Number of Districts
eMINTS Comprehensive	2501	106	22	10
eMINTS4ALL	1351	35	16	7
Non-eMINTS	3160	109	28	9
Total	**7012**	**250**	**35**	**10**

*Most of the schools and districts included had at least two and sometimes three of the groups (eMINTS Comp, 4ALL, non-eMINTS) which is why the **total** number of schools/districts in the table is not a summation of the numbers above it but the total number of schools/districts included in the study.

FORMATION OF A COMPARISON GROUP

Preliminary analysis in our 2008 study showed that the schools and districts from which the eMINTS and non-eMINTS samples were drawn were not comparable in demographics or baseline student performance. Thus a comparison group was not used for comparative analyses. Instead, the study focused on the relationship of the professional development itself to teacher and student outcomes.

The current study utilized a rigorous selection process to create a comparison group of non-eMINTS teachers and students that was comparable to the eMINTS4ALL and eMINTS Comp teachers and students. When possible, non-eMINTS teachers were included that were in the same school and grades as the eMINTS teachers in each district. When this was not possible (e.g., all teachers in a given school's fourth grade were eMINTS), teachers from a comparable school(s) in the same district and grade were used. Teachers from schools that were all non-eMINTS were filtered from the database, since many of these schools were lower need, higher performing schools that were not directly comparable to the eMINTS population.

A small number of schools and one district, however, were all eMINTS in some grades and did not have a comparable group of comparison teachers within the school. Thus the eMINTS and non-eMINTS groups could not be matched perfectly across each grade and school, but researchers aimed to ensure that comparable schools and classrooms were used wherever possible. Analyses performed on demographic information showed that students comprising each group (eMINTS Comp, eMINTS4ALL, and non-eMINTS) did not differ significantly in gender, race, or free and reduced lunch status (FRL). However, it must be emphasized that, because the groups were not randomly assigned, and the manner in which the program was implemented did not allow for an experimental study design, the conclusions that can be drawn from the analyses that involve comparison groups are limited.

PROFESSIONAL DEVELOPMENT FIDELITY DATA

In the first year of the evaluation, EDC/CCT evaluators collaborated with eMINTS program developers to design two observation instruments used to determine the level of PD fidelity experienced by eMINTS participants. One instrument, call the Checklist, collected data about the four-hour professional development session at the end of the session. Another instrument, called the Snapshot, enabled the observer to capture information about the PD session at regular (15-minute) intervals.

Evaluators tested and refined the observation instruments over the year. Ultimately, the instruments reflected the six theory-based core program elements (listed below), with each element broken up into four to seven observable items that are evidenced by the facilitator, the participants, or the interactions of the facilitator with participants (see Martin et al., 2008 for full list of items). After training observers to use the instruments, evaluators tested for inter-rater reliability, and found an acceptable 83 and 88 percent reliability for the Checklist and Snapshot instruments, respectively.

Theory-Based Constructs

- Program logistics and planning
- Modeling instruction
- Community building
- Technology utilization
- Connection to practice
- Inquiry-based learning

DATA COLLECTION

Six eMINTS staff members conducted a total of 50 observations of 28 different instructional specialists facilitating four-hour eMINTS sessions (see Table 2). Observers observed both eMINTS Comp and eMINTS4ALL PD sessions for both Year 1 and Year 2 participants, sitting in on a range of professional development topics during the winter and spring of 2007. Some instructional specialists were observed more than once. Observation data were entered into a standard Microsoft® Excel® form and submitted to the eMINTS Moodle (data sharing) site. In the current study, 13 observations from 13 of these trainings were matched to 76 of the participating eMINTS teachers and their 1,690 students.

Table 2: Number of PD sessions observed, by program and teacher's year in that program

	eMINTS	eMINTS4ALL
Year 1	11	1
Year 2	28	10

CREATING FACTOR ANALYSIS-BASED FACTORS

After the PD observation data were collected, EDC/CCT evaluators conducted a reliability analysis on the items in each category of the Checklist and Snapshot instruments (see Martin et al., 2008). Four factors on the Snapshot instrument showed moderate to strong reliability, ranging from 0.6 to 0.8. Two factors fell below 0.6, one not having sufficient items after preliminary analyses. Only two constructs on the Checklist had reliability above 0.6, probably because there were fewer data points since each item was only completed once. For this reason, only the Snapshot data were used in further analyses.

Evaluators ran a factor analysis to determine if there were better groupings for the items from the Snapshot instrument than the original theory-based constructs. The factor analysis produced five reliable groupings of items. Using the resultant optimal groupings, evaluators created factor analysis-based constructs, with each grouping having four to seven items (for reliability and item level information, see Martin et al., 2008). Using these constructs, an overall fidelity measure, called Factor Analysis-Based Fidelity (FA-Based Fidelity), was computed by averaging all of the composite scores for these factors. This overall fidelity measure and the individual factors are used in further analyses that look at the relationships among PD fidelity, teacher mastery, and student achievement.

Factor Analysis-Based Constructs

- Structured activities
- Participant-led discussion
- Scaffolding instruction
- Facilitating discussion
- Active work/learning

CLASSROOM VISIT RECORD DATA

INSTRUMENT DEVELOPMENT

An important element of the eMINTS program is the regular classroom visits that the eMINTS instructional specialists provide to the teachers during each year of the program. To understand what kind of classroom support eMINTS participants were requesting from their instructional specialists, and how often and for what length of time instructional specialists visited the teachers, EDC/CCT evaluators developed a short Excel worksheet in which instructional specialists could record how many minutes they spent during each visit doing each of the following: modeling instruction, lesson planning, technology assistance, reflective practice, problem-solving, or other, as well as the total amount of time spent on the visit.

DATA COLLECTION

Using the classroom visit instrument, 26 eMINTS instructional specialists recorded what they did during 2,367 classroom visits to 355 teachers, with each specialist visiting their teacher participants up to 10 times over the school year. The instructional specialists then entered the information into the classroom visit Excel worksheets and uploaded them to the eMINTS Moodle. EDC/CCT evaluators downloaded these over the fall, winter, and spring of 2006–2007. In the current

study, classroom visit data were matched to 83 of the participating eMINTS teachers and 1,897 of their students.

In order to compare across all cases the kind of support instructional specialists provided to teachers, EDC/CCT evaluators calculated the percentage of time instructional specialists spent assisting their teachers in each particular area by summing for each teacher the number of minutes spent in each area across visits and dividing by the total number of minutes spent in visitation.

TEACHER MASTERY DATA

INSTRUMENT DEVELOPMENT

To assess how well eMINTS participants understood the key concepts of the eMINTS program, EDC/CCT evaluators reviewed artifacts from teacher portfolios, including lesson plans (from both eMINTS Comp and eMINTS4ALL), WebQuests, and classroom websites (the latter two for eMINTS Comp only). Because the portfolio artifacts are designed by teacher participants to guide their instruction or their interactions with students, the artifacts can serve as proxies, if not for teacher practice, then for teacher understanding of how to structure their instructional practice and use of technology to support students.

After extensive review of existing documents, evaluators created a set of three teacher mastery rubrics, all scored on a three-point scale (high, medium, low): a lesson plan rubric, with a total of 21 items, and a range of 21–63 possible points; a WebQuest rubric and a classroom website rubric, with 17 items each, and a range of 17–51 possible points. Evaluators used expert feedback from the eMINTS leadership team and program staff to revise the teacher mastery rubrics. Three evaluators were trained, reached high inter-rater reliability, and scored all of the teacher mastery items (for inter-rater reliability scores on each instrument, see Martin et al., 2008).

DATA COLLECTION

The eMINTS instructional specialists collected portfolios from those teachers whose districts paid for their eMINTS professional development with Title IID funds, and from other districts that also required teachers to submit portfolios. Using the teacher mastery rubrics, the evaluators scored the teacher artifacts. Overall, EDC/CCT evaluators reviewed 180 lesson plans (99 from eMINTS Comp and 81 from eMINTS4ALL), 95 WebQuests, and 103 classroom websites. In the current study, lesson plan data were matched to 75 of the participating eMINTS teachers and 1,768 of their students. WebQuest data were matched to 51 of the participating

eMINTS teachers and 1,169 of their students. Classroom website data were matched to 51 of the participating eMINTS teachers and 1,174 of their students.

STUDENT-LEVEL DEMOGRAPHIC AND MISSOURI ASSESSMENT PROGRAM (MAP) DATA

In order to measure the impact of the eMINTS program on student performance, as well as relationships among student achievement, program fidelity, and teacher mastery, EDC/CCT evaluators requested and obtained standardized test (MAP) data in communication arts, mathematics, science, and social studies for students in schools that received funding from Title IID and from one other district that provided teacher rosters for the study. Because the science and social studies MAP assessments are not given to all students in each year, we could not match these data across years, so they were not used in some of the analyses.

Of the 7,012 students that matched to the teachers in the current study, 2008 communication arts MAP data were obtained for 6,535 students. Mathematic s MAP data were obtained for 6,542 students. Race information was obtained for 6,829 students. Gender information was obtained for 6,829 students. FRL status was obtained for 6,997 students, and IEP status was obtained for 6,997 students.

Section III: Database Creation and Analyses

CREATION OF THE TEACHER AND STUDENT DATABASE

A database was built for this current study that was comparable to the full student database used in our previous study (Martin et al., 2008). Three years of student MAP data were compiled for each student whose teacher participated in the study. Communication arts and mathematics MAP scores were collected from the 2005–2006, 2006–2007, and 2007–2008 school years. Scores from the 2005–2006 school year were collected as a control variable. Student demographic information was also entered in the database, including the students' grade, race, gender, individualized education program (IEP) status, limited English proficiency (LEP) status, free/reduced price lunch (FRL) status.

Each student's teachers for the 2006–2007 (Year 1 of the study) and 2007–2008 (Year 2 of the study) school years were also entered into the database. Teacher variables could then be matched to the students for two consecutive years. The teacher variables that were selected and entered in the database were similar to the previous year's evaluation. Teachers' eMINTS status (eMINTS Comp, eMINTS4ALL, or non-eMINTS) was entered for each teacher for both years of the study. For example, one student's 2006–2007 teacher could be non-eMINTS, and his or her 2007–2008 teacher could have been trained in the eMINTS Comp program; both statuses were included in the database. Teacher mastery scores, including those for lesson plans, WebQuests, and classroom websites, were entered for each eMINTS teacher in Year 2 of the study. The fidelity of the eMINTS professional development that teachers received, as measured by the Snapshot instrument, was also included for students' 2007–2008 eMINTS teachers. Lastly, the classroom visit data were included for each eMINTS teacher in 2007–2008 and included the number of visits and how much time was spent on each of the five activities discussed above.

COVARIATES

In last year's evaluation report, FRL, gender, race, and IEP were all found to be significant covariates to student performance on the MAP tests. Similar results were found for the current year.

IEP students were found to perform significantly lower on every MAP test in every grade. An example is shown in Table 3. The results were so extreme and the IEP population was small enough that researchers decided to filter IEP students rather than control for this variable.

TABLE 3. MAP scores for fifth-grade students who are in IEP programs versus those who are not.

	IEP students			Non-IEP students			Test statistics	
	N	**Mean**	S.D.		**Mean**	S.D	**t**	**p**
Communication Arts	210	**642.9**	41.7	1559	**677.9**	27.4	16.2	<.001
Mathematics	210	**635.4**	41.7	1560	**671.1**	34.1	13.8	<.001
Sciences	210	**645.1**	32.4	1554	**666.8**	25.7	11.1	<.001

Student gender was also a strong covariate to student performance. Females outperformed males in communication arts in every grade. Males outperformed females in fifth-grade science and in third- and fifth-grade mathematics. FRL was again a strong covariate. Non-FRL students outperformed FRL students on every test in each grade; however, the difference was not as drastic as with the IEP students, and the number of FRL students was larger. Race was again a strong covariate to student performance. Analysis of variance showed significant differences across race on each test in each grade. Thus subsequent analyses control for each of the above demographic variables where appropriate.

MAP scores from previous years were also used as a control variable. Communication arts and mathematics scores (since they are given each year) were compared for each of the two previous years. Student 2008 MAP scores were significantly correlated in each grade to each of the two previous years' test scores. Thus students' 2006 and 2007 MAP scores were used as control variables in the subsequent analyses where appropriate.

FREQUENCIES AND DESCRIPTIVES

For the completed set of data, we tabulated basic frequencies for each relevant variable, first to identify any problems with the data so that the data could be cleaned, and then to see basic results for each type of data. Preliminary and descriptive analyses were also run to ensure the data from all sources were compiled and cleaned accurately. Preliminary analyses also provided rich information about each variable from the teachers and students, creating a context in which to understand the subsequent, more advanced analyses.

ANALYSES

The remaining analyses of this study will aim to answer the primary questions that drove this year's evaluation:

What is the relationship between teacher mastery of eMINTS concepts and student achievement a year after teachers have completed the program?

Our first year evaluation found significant positive relationships between teacher mastery and student achievement on certain MAP tests. For this year's evaluation, we ran similar analyses to confirm and expand upon these findings. We ran correlations on students' communication arts and mathematics scores with each teacher mastery item for each grade. Subsequent regressions were also run controlling for student demographic information and students' MAP scores from the previous year.

What is the relationship between eMINTS program fidelity and student achievement a year after teachers have completed the program?

Last year's evaluation demonstrated significant relationships between eMINTS program fidelity and student achievement on certain MAP tests. For this year's evaluation, we ran similar analyses to confirm and expand upon these findings. We ran correlations on students' communication arts and mathematics scores with overall PD fidelity scores and classroom visit record data for each grade. Subsequent regressions were also run controlling for student demographic information and students' MAP scores from the previous year. Additionally, correlations were run between the fidelity subscales and students' MAP scores.

Do students who have eMINTS teachers for two successive years perform better on standardized assessments than students who do not have eMINTS teachers at all?

and

Do students who have eMINTS teachers for two successive years perform better on standardized assessments than students who have eMINTS teachers for one year?

The final analyses utilized the longitudinal nature of the student data that was compiled over both years of the study; in Year 1 of the study, we collected 2006–2007 MAP data with 2005–2006 scores as a covariate, and in Year 2 of the study, we added the students' 2007–2008 MAP scores. The Year 2 design also allowed for a comparison group of non-eMINTS students to be created for comparison to students who had eMINTS teachers (see *Participants* above).

Analyses were run to see if students who had one year or two years of eMINTS teachers had improved MAP scores when compared to each other and to the comparison group. Students were grouped according to their teachers' eMINTS status (eMINTS Comp, eMINTS4ALL, or non-eMINTS) for the 2006–2007 and 2007–2008 school years. Thus nine student groups were formed (see Table 4).

Table 4. Different groupings for students' exposure to eMINTS teachers in Year 2 analysis

		Teachers' Year 1 eMINTS status		
		eMINTS Comp	eMINTS4ALL	non-eMINTS
Teachers' Year 2 eMINTS status	eMINTS Comp	Group 1	Group 2	Group 3
	eMINTS4ALL	Group 4	Group 5	Group 6
	non-eMINTS	Group 7	Group 8	Group 9

For each grade, researchers checked if there was a sufficient number of students in each group (n > 40) for analyses to have adequate power. For groups that had a sufficient number of students, researchers performed stepwise regressions to identify if there were predicted group differences based on teachers' eMINTS status.

Communication arts and mathematics MAP scores were used as the outcome measures. The first step of the regression models included the strongest covariates: the students' 2005–2006 and 2006–2007 test scores. The second step included the student demographic covariates, and the last step was a "0" or "1" dummy variable identifying one of the two groups that were being compared in that regression. The analyses were performed separately for communication arts tests and mathematics tests in each grade.

Grade 3 (Year 1) to Grade 4 (Year 2)

In grade 4 of the current study, there were a sufficient number of students who had two years of eMINTS Comp teachers (n=344), one year with an eMINTS Comp teacher [both Groups 3 (n=340) and 7 (n=149)], and two years of comparative non-eMINTS teachers (n=313). There was not a sufficient number of students having one (Groups 6 and 8) or two years (Group 5) of eMINTS4ALL teachers or students having one year of eMINTS Comp and one year of eMINTS4ALL (Groups 2 and 4) to be analyzed.

Grade 4 (Year 1) to Grade 5 (Year 2)

In grade 5 of the current study, there were a sufficient number of students who had two years of eMINTS Comp teachers (n=206), one year with an eMINTS Comp teacher [both Groups 3 (n=133) and 7 (n=242)], and two years of comparative non-eMINTS teachers (n=320). There was also a sufficient number of students from Group 6 [having a Year 1 non-eMINTS teacher and Year 2 eMINTS 4ALL teacher (n=158)]. There was not a sufficient number of students having two years of eMINTS4ALL (Group 8) or one year with an eMINTS4ALL teacher or students

having one year of eMINTS Comp and one year of eMINTS4ALL (Groups 2 and 4) to be analyzed.

Grade 5 (Year 1) to Grade 6 (Year 2)

In grade 6 of the current study, there was also a sufficient number of students who had two years of eMINTS Comp teachers (n=52), one year with an eMINTS Comp teacher (both Groups 3 (n=68) and 7 (n=108)), and two years of comparative non-eMINTS teachers (n=454). There was also a sufficient number of students who had two years of eMINTS4ALL teachers [Group 5 (n=62)] and one year with an eMINTS4ALL teacher [both Groups 6 (n=392) and 8 (n=285)]. There was not a sufficient number of students one year of eMINTS Comp and one year of eMINTS4ALL (Groups 2 and 4) to be analyzed.

Section IV: Findings

RELATIONSHIP BETWEEN STUDENT ACHIEVEMENT AND TEACHER MASTERY

In the 2008 evaluation report, we looked at the relationship between teachers' mastery of eMINTS program content as demonstrated in the scores on their portfolio artifacts and student achievement on the 2007 MAP assessment. The assumption was that teachers who understood the content well enough to create teaching materials that reflected the instructional approaches modeled and discussed in the PD sessions and classroom visits would provide their students with higher quality instruction, which would then result in higher achievement. In fact, our analyses did suggest such relationships.

We ran correlations between teacher mastery and standardized test data, split by grade since each grade's assessments have different questions adjusted for grade level. In 2007, at least one teacher mastery score was a significant predictor of student achievement in every grade tested (3 through 5). Higher teacher lesson plan ratings were consistently related to higher student scores in communication arts and mathematics. To further explore this relationship, regression analyses were performed, controlling for covariates, to analyze the impact of teacher mastery on achievement. The first step of the regression controlled for the largest covariate, students' 2006 test scores. Step 2 added other covariates to the regression (race, gender, FRL), and step 3 added each teacher's mastery score independently to see if they explained a significant amount of variance to the regression after controlling for each covariate. Teachers' lesson plan ratings repeatedly explained variance in student achievement on both communication arts and mathematics.

When we looked at student achievement from the 2008 standardized tests, we found that some of these results persisted. In the third grade, the students of teachers who had higher teacher mastery scores on their lessons plans from the previous year continued to outperform those who had low scores. Regressions showed that teacher mastery of lessons plans continued to be a significant predictor of student achievement in third grade. Unlike in 2007, regressions using the 2008 data showed that lessons plans were a significant predictor of student achievement in mathematics in fifth grade as well (in 2007, they were a significant predictor of communication arts for fifth graders). Teacher mastery scores on the WebQuest continued to be a significant predictor of student achievement in fourth-grade mathematics and was almost a significant ($p=.05$) predictor of student achievement in fifth-grade mathematics. Correlations showed that there was a positive relationship between classroom websites and fifth-grade science achievement. In the regressions on the 2008 MAP data, which were only done on communication arts and mathematics data, scores on classroom websites were not significant

predictors of student achievement. See Tables 5–12 for all findings from these analyses.

Table 5. Relationship between teacher mastery and student achievement on the 2007 MAP

		Teacher mastery Item		
Grade	**MAP test**	*Lesson plan*	*WebQuest*	*Classroom website*
3	CA	.14***	ns	ns
3	MA	.15***	.14**	ns
3	SC	ns	ns	ns
4	CA	ns	ns	.10, p=.06
4	MA	ns	ns	.10, p=.06
4	SS	.20**	ns	.25**
5	CA	ns	ns	.40***
5	MA	ns	ns	.32***

**p < .01 ***p < .001, ns – not significant

Table 6. Relationship between teacher mastery and student achievement on the 2008 MAP

		Teacher mastery Item		
Grade	**MAP test**	*Lesson plan*	*WebQuest*	*Classroom website*
3	CA	.12**	ns	ns
3	MA	.10*	ns	ns
3	SC	N/A	N/A	N/A
4	CA	ns	ns	ns
4	MA	ns	ns	ns
4	SC and SS	N/A	N/A	N/A
5	CA	ns	ns	ns (.16, p=.08)
5	MA	ns	ns	ns
5	SC	-.14**	ns	.27**

*p < .05, **p < .01, ns – not significant

Table 7. Amount of variance in students' MAP data explained by teachers' lesson plans, after controlling for all covariates on 2007 MAP

Grade	MAP test	Variance explained by Lesson plan	Beta	t	p
3	CA	2.0%*	.14	3.46	p < .001
3	MA	2.2%*	.15	3.71	p < .001
4	CA	ns			
4	MA	ns			
5	CA	0.5%	.07	2.10	p < .05
5	MA	ns			

*Analyses were run without the 2006 MAP scores in the model because there were no scores for grade 2.
ns – not significant

Table 8. Amount of variance in students' MAP data explained by teachers' lesson plans, after controlling for all covariates on 2008 MAP

Grade	MAP test	Variance explained by Lesson plan	Beta	t	p
3	CA	1.1%*	.10	2.5	p < .05
3	MA	0.8*	.09	2.1	p < .05
4	CA	ns			
4	MA	ns			
5	CA	ns			
5	MA	0.7%	.08	2.1	p < .05

*Analyses were run without the 2007 MAP scores in the model because there were no scores for grade 2.
ns – not significant

Table 9. Amount of variance in students' MAP data explained by teachers' WebQuests, after controlling for all covariates on the 2007 MAP

Grade	MAP test	Variance explained by WebQuest	Beta	t	p
3	CA	ns*			
3	MA	ns*			
4	CA	ns			
4	MA	0.9%	-.10	-3.03	p < .01
5	CA	ns			
5	MA	3.3%	.19	3.68	p < .001

*Analyses were run without the 2006 MAP scores in the model because there were no scores for grade 2.
ns – not significant

Table 10. Amount of variance in students' MAP data explained by teachers' WebQuests, after controlling for all covariates on the 2008 MAP

Grade	MAP test	Variance explained by WebQuest	Beta	t	p
3	CA	ns*			
3	MA	ns*			
4	CA	ns			
4	MA	0.6%	.08	2.2	p < .05
5	CA	ns			
5	MA	1.4%	.13	2.0	p = .05

*Analyses were run without the 2007 MAP scores in the model because there were no scores for grade 2.
ns – not significant

Table 11. Amount of variance in students' MAP data explained by teachers' classroom websites, after controlling for all covariates from 2007 MAP

Grade	MAP test	Variance explained by Classroom website	Beta	t	p
3	CA	ns*			
3	MA	ns*			
4	CA	ns			
4	MA	ns			
5	CA	4.0%	.22	3.68	p < .001
5	MA	1.7%	.14	2.57	p < .02

*Analyses were run without the 2006 MAP scores in the model because there were no scores for grade 2.
ns – not significant

Table 12. Amount of variance in students' MAP data explained by teachers' classroom websites, after controlling for all covariates from 2008 MAP

Grade	MAP test	Variance explained by Classroom website	Beta	t	p
3	CA	ns*			
3	MA	ns*			
4	CA	ns			
4	MA	ns			
5	CA	ns			
5	MA	ns			

*Analyses were run without the 2007 MAP scores in the model because there were no scores for grade 2.
ns – not significant

RELATIONSHIP BETWEEN STUDENT ACHIEVEMENT AND PD FIDELITY

EDC/CCT evaluators ran analyses to understand the relationship between PD fidelity and student achievement. When we looked at the 2007 MAP data, we found that PD fidelity was correlated with student scores in third, fourth, and fifth grades. Fidelity was a significant predictor of fifth-grade scores after controlling for all covariates in regressions. When we analyzed the data from the 2008 MAP, we found significant correlations between PD fidelity and student achievement in fourth and fifth grades, and when the regressions were run, fidelity continued to be a significant predictor for fifth-grade student achievement. See Tables 13–15 for results of correlations and regressions on 2007 and 2008 MAP data.

Table 13. Relationship between PD fidelity and student achievement on the 2007 and 2008 MAP

Grade	MAP test	2006–2007 Overall fidelity	2007–2008 Overall fidelity
3	CA	ns	ns
3	MA	.10*	.08 (p=.06)
3	SC	ns	N/A
4	CA	.17***	.11*
4	MA	.20***	.10*
4	SS	.21**	N/A
5	CA	.26***	.14**
5	MA	.30***	.11*
5	SC	N/A	ns

*p < .05 **p < .01 ***p < .001 ns – not significant

Table 14. Amount of variance in students' MAP data explained by PD fidelity, after controlling for all covariates on 2007 MAP

Grade	MAP test	Variance explained by PD fidelity	Beta	t	p
3	CA	ns*			
3	MA	ns*			
4	CA	ns			
4	MA	ns			
5	CA	1.3%	.13	3.7	p < .001
5	MA	0.9%	.10	3.1	p < .01

*Analyses were run without the 2006 MAP scores in the model because there were no scores for grade 2.
ns – not significant

Table 15. Amount of variance in students' MAP data explained by PD fidelity, after controlling for all covariates on 2008 MAP

Grade	MAP test	Variance explained by PD fidelity	Beta	t	p
3	CA	ns*			
3	MA	ns*			
4	CA	ns			
4	MA	ns			
5	CA	0.7%	.10	1.9	p = .06
5	MA	0.7%	.10	2.1	p < .05

*Analyses were run without the 2006 MAP scores in the model because there were no scores for grade 2.
ns – not significant

As previously described in the Methods section, PD fidelity is not a singular conceptual construct but rather comprises different sets of factors. We describe one set of these factors as *theory-based* fidelity, because it represents the core concepts upon which the developers based the program. These factors include the following:

- Modeling instruction
- Community building
- Connection to practice
- Technology utilization
- Inquiry-based learning

We describe the second set of factors as *factor analysis-based* fidelity, because they were derived from a factor analysis conducted after the observation data were collected. These factors are as follows:

- Structured activities
- Scaffolding instruction
- Participant-led discussion
- Facilitated discussion
- Active work/learning

One reason for creating these separate factors was to allow for a deeper and more nuanced understanding of PD fidelity and its relationship to program impact than we would have by simply assigning an overall fidelity score to a PD session or instructional specialist. Having a range of factors allows us to conduct analyses to assess whether certain aspects of PD sessions have stronger relationships to program outcomes than others. In the analysis of 2007 MAP data, we found that nearly all of the theory-based factors, and a number of the factor analysis-based factors, were associated with program impact (see Table 16). Therefore, in that analysis it was difficult to say whether certain aspects of the program appeared more important than others. The analysis of the 2008 data shows similar patterns to the previous year, but certain factors appear to have stronger relationships with student outcomes, and in some cases with certain grade levels, than others (see Table 17). Among the theory-based factors, technology utilization seems to have the most consistent relationship with program impact across all grades, while community building seems to have a strong relationship with impact in third grade, modeling instruction in fourth, and inquiry-based learning in fifth. Among the factor

analysis-based factors, scaffolding instruction seems to have the strongest relationship with impact across all grades, while facilitated discussion is associated with impact in the fourth and fifth grades.

Table 16. Correlation between 2007 MAP scores and eMINTS PD fidelity factors

Dark gray areas indicate positive correlations, and light gray areas indicate negative correlations.
(Legend: SA=Structured Activities, PD=Participant-Led Discussion, SI=Scaffolding Instruction, FD=Facilitated Discussion, AW=Active Work/Learning, MI=Modeling Instruction, CB=Community Building, TU=Technology Utilization, CP=Connection to Practice, IBL=Inquiry-Based Learning.)

		Factor Analysis-Based Factors					Theory-Based Factors				
Grade	**MAP**	*SA*	*PD*	*SI*	*FD*	*AW*	*MI*	*CB*	*TU*	*CP*	*IBL*
3	CA	ns	ns	.12**	ns	ns	ns	ns	.08^{t}	ns	ns
3	MA	-.09*	.09*	.19***	ns	ns	.09*	ns	.16***	ns	ns
3	SC	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
4	CA	-.13**	.12*	.25***	.09^{t}	ns	.16***	ns	.21***	.11*	.11*
4	MA	-.10*	.14**	.27***	.12*	ns	.20***	.10*	.21***	.14**	.11*
4	SS	ns	.30***	.19**	.13^{t}	.21**	.24***	.25***	.16*	.17*	.18*
5	CA	ns	.11*	.32***	.16***	ns	.17***	.10*	.31***	.20***	.28***
5	MA	ns	.17***	.36***	.21***	ns	.17***	.17***	.35***	.22***	.31***

*p < .05 **p < .01 ***p < .001, ^{t}p < .08 ns – not significant

Table 17. Correlation between 2008 MAP scores and eMINTS PD fidelity factors

Dark gray areas indicate positive correlations, and light gray areas indicate negative correlations.
(Legend: SA=Structured Activities, PD=Participant-Led Discussion, SI=Scaffolding Instruction, FD=Facilitated Discussion, AW=Active Work/Learning, MI=Modeling Instruction, CB=Community Building, TU=Technology Utilization, CP=Connection to Practice, IBL=Inquiry-Based Learning.)

		Factor Analysis-Based Factors					Theory-Based Factors				
Grade	**MAP**	*SA*	*PD*	*SI*	*FD*	*AW*	*MI*	*CB*	*TU*	*CP*	*IBL*
3	CA	ns	ns	.12**	ns	-.17***	ns	.08^{t}	ns	ns	-.10*
3	MA	ns	.12**	.16***	ns	ns	ns	.09*	.11*	ns	ns
3	SC	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4	CA	-11*	ns	.23***	ns	ns	.10*	ns	.18***	ns	ns
4	MA	ns	ns	.24***	.09^{t}	-.11*	.10*	ns	.18***	ns	ns
4	SS	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5	CA	ns	ns	.22***	.11*	ns	ns	ns	.19***	ns	.16**
5	MA	.09^{t}	ns	.14**	.12*	ns	ns	ns	.12*	ns	.12*
5	SC	ns	ns	.13*	ns	-.20***	ns	-.10^{t}	ns	ns	ns

*p < .05 **p < .01 ***p < .001, ^{t}p < .08 ns – not significant

RELATIONSHIP BETWEEN STUDENT ACHIEVEMENT AND CLASSROOM VISITS

The next set of analyses we ran looked at the relationship between the activities instructional specialists engaged in with teachers during their classroom visits and

student outcomes. When we ran correlations on the 2007 MAP data, we found that there was a significant, positive relationship between the amount of time that instructional specialists spent on lesson planning and student achievement in fourth and fifth grades, and a significant, negative relationship between the amount of time they spent modeling instruction and student achievement in third, fourth and fifth grades (see Table 18). Those same relationships persisted into the year following the teachers' completion of the two-year professional development program, even though the instructional specialists were no longer visiting the teachers in question. Correlations run on the 2008 MAP data demonstrated that there was a significant, positive relationship between time spent on lesson planning during classroom visits and student achievement, and a significant, negative relationship between modeling instruction and student achievement (see Table 19).

Table 18. Correlations between 2007 MAP scores and classroom visits

Included variables are the total number of visits and percent time doing each activity. Light gray boxes indicate a negative correlation, and dark gray boxes indicate a positive correlation.

Grade	**MAP**	Number of visits	*Modeling Instruction*	*Lesson planning*	*Technology Assistance*	*Reflective Practice*	*Problem Solving*	*Other*
3	CA	ns	ns	ns	ns	ns	ns	ns
3	MA	-.08*	-.09*	ns	ns	ns	ns	ns
3	SC	ns	ns	ns	-.12*	ns	ns	ns
4	CA	-.18*	ns	.11*	ns	ns	ns	ns
4	MA	-.18*	-.09*	.11*	ns	ns	ns	ns
4	SS	ns	-.12^{t}	ns	-.12^{t}	.25***	ns	ns
5	CA	ns	-.22***	.18***	ns	ns	ns	.10*
5	MA	ns	-.20***	.19***	ns	ns	-.09*	.10*

*p < .05 **p < .01 ***p < .001, ^{t}p < .06 ns – not significant

Table 19. Correlations between 2008 MAP scores and classroom visits

Included variables are the total number of visits and percent time doing each activity. Light gray boxes indicate a negative correlation, and dark gray boxes indicate a positive correlation.

Grade	**MAP**	Number of visits	*Modeling Instructions*	*Lesson planning*	*Technology Assistance*	*Reflective Practice*	*Problem Solving*	*Other*
3	CA	ns	-15***	ns	ns	ns	ns	ns
3	MA	ns	-1.9***	.15***	ns	ns	ns	-.09*
3	SC	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4	CA	-.12**	-.16***	.11*	ns	ns	ns	ns
4	MA	-.14***	-.24***	.11*	ns	ns	-.09*	ns
4	SS	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5	CA	ns	-.23***	.17***	ns	ns	ns	ns
5	MA	ns	-.13**	ns	ns	ns	ns	ns
5	SC	.17***	-.26***	.20***	ns	.14**	ns	ns

*p < .05 **p < .01 ***p < .001, ns – not significant

LONGITUDINAL IMPACT OF eMINTS ON STUDENT ACHIEVEMENT

Along with following the teachers into the year after they completed the two-year program to see if program participation continued to have an impact, we also followed the students from our 2008 evaluation to see whether the amount of exposure they had over two successive years to eMINTS teachers was related to their achievement. However, as noted above, because the study was not designed as a randomized controlled experiment, no causal conclusions can be drawn from these findings. The results can only point out patterns of relationships that can be investigated further.

The first regressions we ran compared MAP scores for students who had two years of teachers who participated in the eMINTS program to students who had two years of non-eMINTS teachers. For communication arts, spending two years with eMINTS Comp teachers was a significant, positive predictor of student performance in fifth and sixth grades; however, it was negative in fourth grade (see Table 20). For mathematics, having two years with eMINTS Comp teachers was a significant, positive predictor of student performance in sixth grade and not significant for the other two grades (see Table 20).

Table 20. Variance predicted and coefficients for MAP scores of students having two years with eMINTS Comprehensive teachers compared to students having two years with no eMINTS teachers.

Grade in Year 2	MAP test	Variance explained by having two Comp. eMINTS teachers	Unstandardized Coefficients		Beta	t	p
			B	S.E.			
4	CA	0.6%	- 4.6	2.0	- 0.08	- 2.32	< .05
4	MA	ns					
5	CA	0.5%	4.3	2.0	.075	2.2	< .05
5	MA	ns					
6	CA	0.6%	7.7	3.4	.087	2.3	< .05
6	MA	4.7%	27.2	3.7	.245	7.4	< .001

ns – not significant

These results show that having two years with eMINTS may be beneficial for student academic achievement, especially when students are in grades 4 and 5 and grades 5 and 6. It is not clear why the results were negative for the group that went from third to fourth grade, though it should be noted that the fourth grade non-eMINTS group overall in this sample was particularly high-performing. We did not find significant results when we looked at students who had only one year of eMINTS Comp teachers compared to non-eMINTS teachers, suggesting that students need long-term exposure to the kind of instruction eMINTS teachers provide for the impact to be evident in assessment results.

After seeing significant differences from having two years of eMINTS Comp teachers when compared to two years of non-eMINTS teachers, researchers analyzed the impact of having two years of eMINTS Comp teachers compared to only one year with an eMINTS Comp teacher.

The first analysis looked at students who had an eMINTS Comp teacher in Year 1, but a non-eMINTS teacher in Year 2 compared to students who had two years of eMINTS Comp teachers. Having two years of eMINTS Comp teachers was found to be a significant, positive predictor for student MAP scores in sixth grade, for both communication arts and mathematics (see Table 21). It is notable that the variance explained by having two years of eMINTS Comp teachers for sixth grade mathematics is quite large.

Table 21. Variance predicted and coefficients for MAP scores of students having two years with eMINTS Comprehensive teachers compared to students having an eMINTS Comprehensive teacher in Year 1 only.

Grade in Year 2	MAP test	Variance explained by having two Comp. eMINTS teachers	Unstandardized Coefficients		Beta	t	p
			B	S.E.			
6	CA	4.2%	11.7	3.5	.236	3.3	= .01
6	MA	18.0%	34.4	4.5	.494	7.7	< .001

The next analysis looked at students who had a non-eMINTS teacher in Year 1 and an eMINTS Comp teacher in Year 2, compared to two years of eMINTS Comp. Having two years of eMINTS Comp teachers was again found to be a significant, positive predictor for student MAP scores in sixth grade, for both communication arts and mathematics (see Table 22). Again, it is notable that the variance explained by having two years of eMINTS Comp teachers for sixth grade mathematics is quite large.

Table 22. Variance predicted and coefficients for MAP scores of students having two years with eMINTS Comprehensive teachers compared to students having an eMINTS Comprehensive teacher in Year 2 only.

Grade in Year 2	MAP test	Variance explained by having two Comp. eMINTS teachers	Unstandardized Coefficients		Beta	t	p
			B	S.E.			
6	CA	4.2%	9.7	3.4	.213	2.9	< .01
6	MA	23.8%	33.5	3.5	.511	9.5	< .001

These results again show that having two years of exposure to teachers who participated in eMINTS Comp may be beneficial for student academic achievement, even over having one year with eMINTS Comp, especially when students are in grades 5 and 6.

We also ran analyses that looked at the difference between having two years of eMINTS Comp teachers compared to two years of eMINTS4ALL teachers. Having two years of eMINTS Comp teachers was again found to be a significant, positive predictor for student MAP scores in sixth grade, for both communication arts and mathematics (see Table 23).

Table 23. Shows the variance predicted and coefficients for student MAP scores for having two years with eMINTS Comprehensive teachers compared to students who have had two years with eMINTS 4ALL teachers.

Grade in Year 2	MAP test	Variance explained by having two Comp. eMINTS teachers	Unstandardized Coefficients		Beta	t	p
			B	S.E.			
6	CA	11.2%	21.4	4.0	.445	5.3	< .001
6	MA	15.7%	35.5	5.9	.527	6.0	< .001

We conducted analyses that examined the impact of having eMINTS4ALL over two years compared to one year or no years. The analyses in some cases showed no significance and other cases showed inconsistent results, most likely because of the lower number of students that fell in these eMINTS4ALL groups.

Section V: Discussion

Since its inception, eMINTS program developers have used external evaluation to examine the program and understand what kind of impact it is having on participants and their students. The evaluation EDC/CCT completed in 2008 looked at whether the program was delivered in a manner that faithfully reflected core program goals, if higher program fidelity was associated with greater mastery of session content and concepts by teachers, and further, if both of these were associated with higher levels of student achievement. The results of our analyses suggest that those relationships did, in fact, exist.

In this second round of evaluation, we wanted to further examine program impact in two ways. First, we wanted to look at the same relationships we explored in the previous year—among PD fidelity, classroom visits, teacher mastery, and student achievement—to see if the level of program fidelity experienced by participants had an influence on the program's impact, even a year after they had completed the two-year program. To do this, we used the same program fidelity and teacher mastery data from the first year and looked to see if the scores of their students in the following year were similarly associated with fidelity and mastery levels. Second, we wanted to see if there was any relationship between the amount of experience students had with eMINTS teachers over two years and their achievement levels. To do this, we followed all of the students in schools that had eMINTS teachers in them over two years, categorized their experience with eMINTS teachers, and compared students' 2008 MAP results.

Analyses on the 2008 MAP data, in relation to the program fidelity and teacher mastery data, revealed striking results. Not only did we see that there continued to be positive relationships among program fidelity, teacher mastery, and student achievement, but the specific patterns of the relationships persisted. For example, teacher scores on their lesson plans were significantly associated with higher student achievement among third graders, and only third graders, in both analyses. PD fidelity was associated with higher student achievement in third-grade mathematics and fourth- and fifth-grade mathematics and communication arts; regressions in both years showed that fidelity was a significant predictor of student achievement in only the fifth grade. Lesson planning during classroom visits was positively associated with student achievement over both years. The consistency of these findings provides even greater evidence that the associations we identified in the first evaluation were not random but showed actual program effects.

Analyzing how the specific factors comprising overall PD fidelity relate to student achievement also revealed interesting findings. In last year's analysis, it appeared that a range of factors was associated with student achievement, but this year,

certain factors stood out. Among the theory-based fidelity factors, technology utilization seems to have the strongest relationship across all the grades, suggesting that the eMINTS approach to technology integration, which focuses on using technology in the service of instruction, may be particularly helpful to students. It is also interesting that different theory-based fidelity factors seem to have stronger relationships with achievement in different grades. For example, higher third-grade MAP scores are associated with teachers who experienced higher levels of community building in their PD sessions, while higher fifth-grade scores are associated with teachers who experienced higher levels of inquiry-based learning in their PD sessions. These findings may suggest that different instructional practices presented in the eMINTS PD sessions are particularly effective for students of different ages.

Further, our analysis of differences in MAP scores based on the amount of exposure students had to eMINTS teachers over two years resulted in some compelling findings. Students having two years with eMINTS Comp teachers performed better than students having two years of non-eMINTS teachers in fifth- and sixth-grade communications arts and sixth-grade mathematics. Students with two years of eMINTS Comp teachers also achieved higher communication arts and mathematics MAP scores in sixth grade than students having only one year with an eMINTS Comp teacher. In addition, students having two years of eMINTS Comp teachers outperformed students having two years with eMINTS4ALL teachers in sixth-grade mathematics and communication arts. Though it should also be noted that students who went from third to fourth grade with eMINTS teachers appeared to perform worse on the communication arts MAP, the overall patterns show a positive impact.

We have noted a number of times above that one of the main limitations of the analysis of student data over two years is that the conclusions that can be drawn from the findings are limited because the study was not designed experimentally, and the eMINTS and non-eMINTS teachers were not perfectly matched. In addition, some groups also could not be compared or analyzed because of insufficient power due to a low number of teachers or students. However, the consistency of the patterns identified through these analyses, more than any specific finding for any specific grade or assessment, is striking. Overall, the results of the student analysis show that time and again, particularly for children in fifth and sixth grades, having repeated exposure to teachers who have gone through eMINTS Comp seems to be associated with higher achievement. Coupled with the findings from the analysis of teacher mastery and fidelity from this year and last year, this evaluation provides evidence that, when implemented faithfully, eMINTS can have a consistent positive impact, particularly for upper elementary (fourth to sixth grade) students and teachers. These findings would be strengthened, and a stronger causal claim about

the program could be made, by using an experimental design within one or a smaller subset of comparable districts in a future study to explore student impact.