



# Analysis of MAP Results for Expansion Classrooms



**Tracy Dranginis**

**September 2004**

---

September 3, 2004

## **Analysis of MAP Results for Expansion Classrooms**

Tracy K. Dranginis

This policy brief examines the quantitative impacts of the eMINTS expansion project. The report analyzes 2001 and 2002 Missouri Assessment Program (MAP) results for eMINTS students in classrooms with teachers who have completed the eMINTS professional development training and are serving as Mentors to students in classrooms with teachers undertaking the eMINTS training (Mentored teachers), students in Mentored teachers' classrooms, as well as non-eMINTS students in classrooms in that grade in the same school building. Additional analysis explores the relationships of teacher status, student average MAP scores, and classroom instructional practices categorized according to the eMINTS lesson typology. Results suggest that the structure employed in the expansion project may have helped newly mentored teachers adopt inquiry-based instructional practices more quickly, but the pace of these adoptions did not necessarily help student performance.

### **Introduction**

This report presents MAP test results from the first and second cohorts of eMINTS schools to participate in expansion of the program during its third year in these schools by adding new eMINTS classrooms. The expansion cohorts began the professional development program in the autumns of 2001 and 2002. In addition to the professional development program as previously implemented, veteran eMINTS teachers provided mentoring to the expansion cohorts. This report analyzes the overall difference in MAP scores by eMINTS enrollment and the observed application of inquiry-based instructional practices in the expansion classrooms.

The FY01 and FY02 eMINTS expansion project was an experiment into the ways that eMINTS resources can be leveraged to support whole school reform. The eMINTS program is focused on assisting teachers in their adoption of inquiry-based instructional practices. Frequently this adoption requires that teachers revise their entire instructional philosophies and approaches to teaching. From the beginning, the eMINTS program has understood that this can be a long and difficult process. The expansion project attempted to ease the transition to inquiry-based instruction by pairing a new eMINTS teacher with an experienced eMINTS teacher. The expectation was that the experienced eMINTS teacher, the mentor teacher, would help the new eMINTS teacher, the mentored teacher, make this transition.

During the third year of the program, 27 expansion schools were selected from the first and second cohorts of the eMINTS project in order to explore the impact of eMINTS within individual schools. The 27 schools in 25 districts participating in the eMINTS expansion project received two additional eMINTS classrooms and professional development for two additional eMINTS teachers in the third- and/or fourth-grades.

This report is one product of the eMINTS evaluation project. Other reports and their overall evaluation plan are available at <http://www.emints.org/evaluation/>.

*The eMINTS Evaluation focuses on student impacts, teacher impacts, changes in learning environments, and outcomes of project services.*

## **The eMINTS Program<sup>1</sup>**

The eMINTS program is designed to transform the instructional process by supporting elementary teachers in grades three through six as they develop student-centered, inquiry-based instructional practices using a wide range of multimedia and computer technologies. Teachers and students explore interactive learning experiences that require them to use critical-thinking skills and group problem-solving techniques. Significant professional development sessions along with in-classroom coaching and mentoring are key change agents in this project.

Each eMINTS teacher participates in over 200 hours of ongoing professional development during a two-year period. The professional development sessions are supplemented by instructional specialists who coach and support eMINTS teachers in their classrooms. Each eMINTS classroom is equipped with a teacher workstation and laptop, a scanner, a color printer, a digital camera, an interactive whiteboard (a SMART Board), a high lumen projector and one computer for every two students. Student computers are outfitted with a standard suite of productivity software. All eMINTS computers are connected to the MOREnet high-speed Internet backbone.

## **Plan of Analysis**

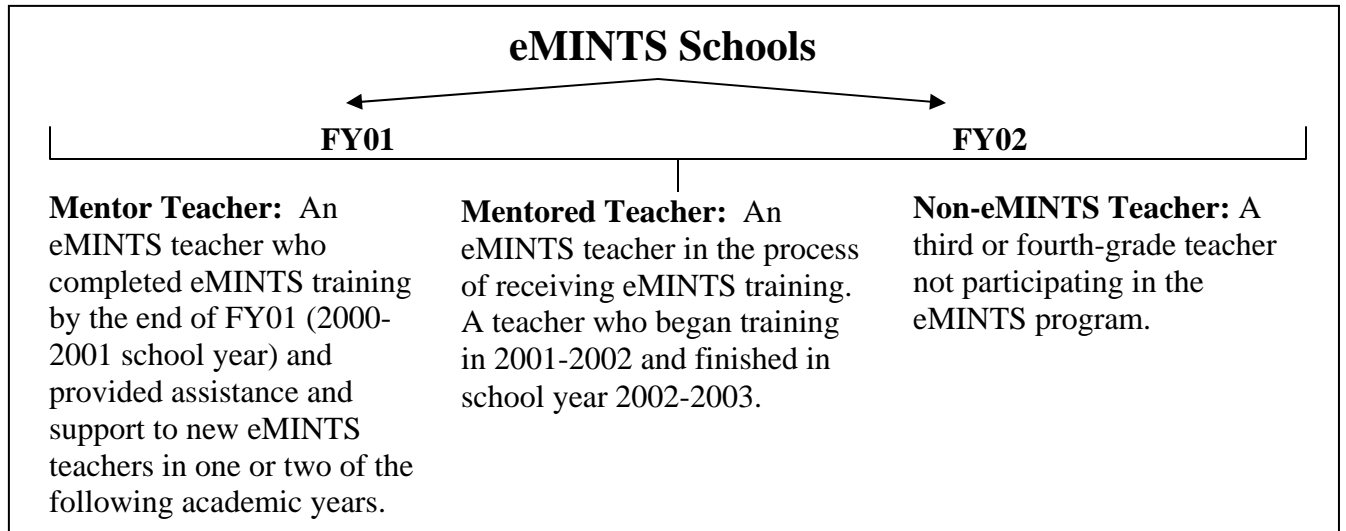
This report presents quantitative results from the 25 schools participating in the eMINTS expansion project in the school years beginning in the autumns of 2001 and 2002. The results presented in this report describe the impact of eMINTS participation on student performance on the Missouri Assessment Program (MAP) tests and demonstrate the relationships between MAP scores and classroom instructional practices as categorized according to the eMINTS lesson typology.

---

<sup>1</sup> Information about the eMINTS program is available at <http://www.emints.org/>.

## Classifying Groups of Teachers

The analytical focus of this section of the expansion report is on student MAP test performance among students in three types of classrooms:



The following discussion compares the performance of students enrolled in an eMINTS classroom with a Mentor teacher to the performance of students in an eMINTS classroom with a Mentored teacher. Each type of eMINTS classroom is then compared to the performance of students not in an eMINTS classroom but enrolled in the same grades and schools. This strategy controls for school characteristics by drawing both the “experimental” groups (i.e., the students enrolled in the eMINTS classes) and the “control” group (i.e., the students not enrolled in the eMINTS classes) from the common environment of the participating schools. Comparing the performance of students by type of classroom allows for the assessment of the general impact of the program. Further comparing the performance of eMINTS students by the mentoring status of the teachers allows an assessment of the impact of the mentoring process.

**Table 1**  
**Basic Statistics for eMINTS Expansion Schools, FY01 – FY02**

	Number of Classrooms	Number of Students	Number of Classrooms	Number of Students
	<i>Communication Arts FY01</i>		<i>Science FY01</i>	
eMINTS Mentor	24	638	24	642
eMINTS Mentored	24	609	24	631
non-eMINTS	57	1327	57	1328
Total	105	2574	105	2601

	<i>Mathematics FY01</i>		<i>Social Studies FY01</i>	
eMINTS Mentor	19	659	25	663
eMINTS Mentored	23	765	26	767
non-eMINTS	65	1346	55	1349
Total	107	2770	106	2779

	Number of Classrooms	Number of Students	Number of Classrooms	Number of Students
	<i>Communication Arts FY02</i>		<i>Science FY02</i>	
eMINTS Mentor	17	578	16	552
eMINTS Mentored	22	478	20	459
non-eMINTS	66	1702	65	1689
Total	105	2758	101	2700

	<i>Mathematics FY02</i>		<i>Social Studies FY02</i>	
eMINTS Mentor	21	642	21	643
eMINTS Mentored	25	712	24	691
non-eMINTS	55	1418	54	1403
Total	102	2772	99	2737

The number of classrooms and students by type of teacher and by expansion year are presented in Table 1. These teachers and students come from a population of 25 schools, each in a different district. A total of 105 third-grade classes and 107 fourth-grade classes are represented in the eMINTS expansion datasets. In each grade approximately 40 and 45 percent of all students are enrolled in eMINTS classes.

## **Two Perspectives on MAP Scores**

The MAP tests are standards-based assessments administered statewide in grades 3 through 5, grades 7 through 9 and grades 10 and 11. The assessments include constructed response items and performance events in addition to multiple-choice items.<sup>2</sup> This report analyzes total scores on the four MAP tests administered in the third- and fourth-grade. Students are tested in Communication Arts and science in the third-grade and in mathematics and Social Studies in the fourth-grade. Students are not tested on the same subjects in consecutive years.

In this report MAP scores are reported in two ways:

- 1) Using the percentage distribution of the five-category achievement level scale, and
- 2) Using the raw MAP scores.

The first measure is the conventional measure used to assess the performance of school buildings. Considering the raw scores allows for the quantitative characterization of individual students and their differences.

## **MAP Achievement Levels**

Individual student performance on the various MAP tests is typically expressed in terms of a five-category achievement-level scale. This scale provides a general gauge of performance: Step One, Progressing, Nearing Proficiency, Proficient and Advanced. For school buildings, the overall percentage distribution of these five achievement levels is used as an aggregate measure of school performance. The following analysis compares all eMINTS classes to non-eMINTS classes in the expansion schools.

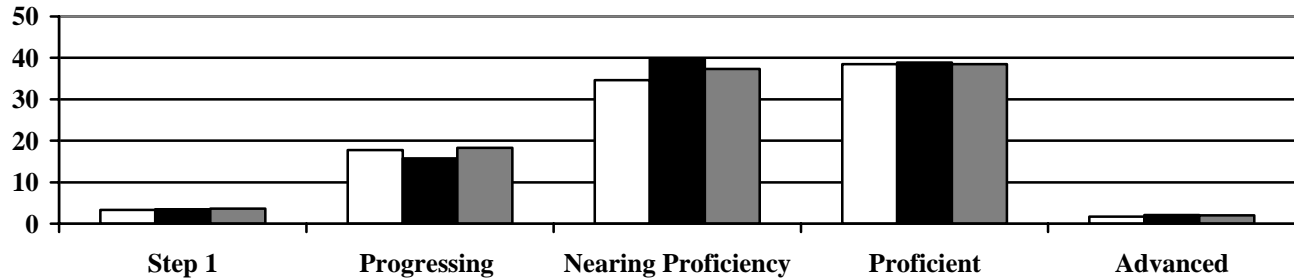
The differences in the distribution are presented in Figures 1 through 4. While small statistically significant differences exist in the distribution of MAP scores by eMINTS-classroom status on the third-grade communications arts test in Year One and the fourth-grade math test in Year Two, no other data can be interpreted to show that enrollment in an eMINTS classroom is related to qualitatively different results for students on the other MAP tests considered in this report. With the issue of statistical significance taken into account, it is worth noting that eMINTS students proved consistently more likely to achieve scores falling in the Proficient and Advanced categories than students in non-eMINTS classrooms. However, within eMINTS classrooms no consistency can be found among student scores in eMINTS classrooms based on the status of their teachers in the mentoring program.

---

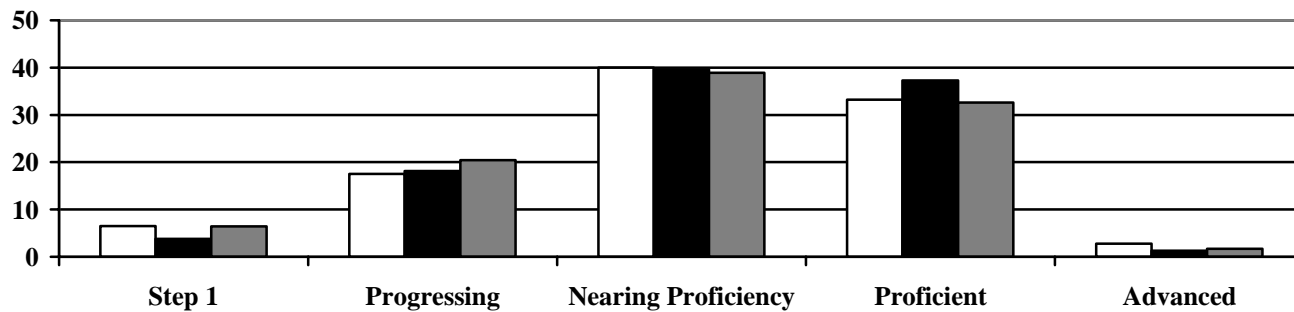
<sup>2</sup> Information on the Missouri Assessment Program is available at <http://www.dese.state.mo.us/divimprove/assess/>

**Figure 1**  
**MAP Achievement-Level Results: Communication Arts**

Expansion Year FY01



Expansion Year FY02



MAP Achievement Level	eMINTS Mentor Teachers <i>FY01</i>	eMINTS Mentored Teachers <i>FY01</i>	non-eMINTS Teachers <i>FY01</i>	All Teachers <i>FY01</i>
Step 1	3.3	3.5	3.6	3.5
Progressing	17.8	15.8	18.3	18.3
Nearing Proficiency	34.6	39.7	37.3	37.2
Proficient	38.5	38.9	39.5	39.1
Advanced	1.7	2.1	2.0	1.9
Total Percent	100.0	100.0	100.0	100.0
Total Students	633	625	1318	2576
P-Value	0.059			

**Figure 1 (continued).**

MAP Achievement Level	eMINTS Mentor Teachers	eMINTS Mentored Teachers	non-eMINTS Teachers	All Teachers
	<i>FY02</i>	<i>FY02</i>	<i>FY02</i>	<i>FY02</i>
Step 1	6.5	3.8	6.4	6.0
Progressing	17.5	18.1	20.4	19.4
Nearing Proficiency	40.0	39.6	38.9	39.3
Proficient	33.2	37.3	32.6	33.5
Advanced	2.8	1.3	1.7	1.8
Total	100.0	100.0	100.0	100.0
Total Number of Students	572	475	1681	2728
P-Value	.070			

*Results for Communication Arts*

The analysis of the first expansion year shows a marginally statistical difference between students enrolled in eMINTS classrooms and non-eMINTS classrooms on the MAP Communication Arts test. For both years of the expansion project, however, the most intriguing changes in Communication Arts scores occurs by examining changes in scores within the status of teacher, rather than between types of teachers within years. During the first year, 41.5 percent of students in non-eMINTS classrooms scored in the categories of Proficient or Advanced while 40.2 percent and 41.0 percent of students, respectively, in eMINTS Mentor-teacher and Mentored-teacher classrooms scored in these categories (see Figure 1). For all types of classrooms, the second largest percentage of students fell in the Nearing Proficiency category. However, Nearing Proficiency was the achievement level where the greatest variation between the percentages of students by teacher status occurred. For example, approximately 5 percent fewer Mentor-teacher students scored within this category than Mentored-teacher students. In the first year of the expansion project, the percentage of non-eMINTS students scoring in the Nearing Proficiency category fell between the percentages of Mentor- and Mentored-teacher students, but this scenario did not occur in the second year of the expansion project.

When considering the change between the first and second years of the expansion project by teacher status, some anticipated patterns emerge. Both notable and anticipated is the consistency in the shape of the distribution within a teacher status. In both expansion years, regardless of teacher status, the distribution of the percentage of students scoring in each achievement level remains remarkably consistent. While the shape of the distribution does not quite conform to a normal bell-shaped curve, as expected and reflective of the general performance of the Missouri student population, most students scored in the middle range categories of Nearing Proficient and Proficient. A lesser, but still meaningful, percentage of students, approximately twenty percent, scored in the Progressing achievement level.

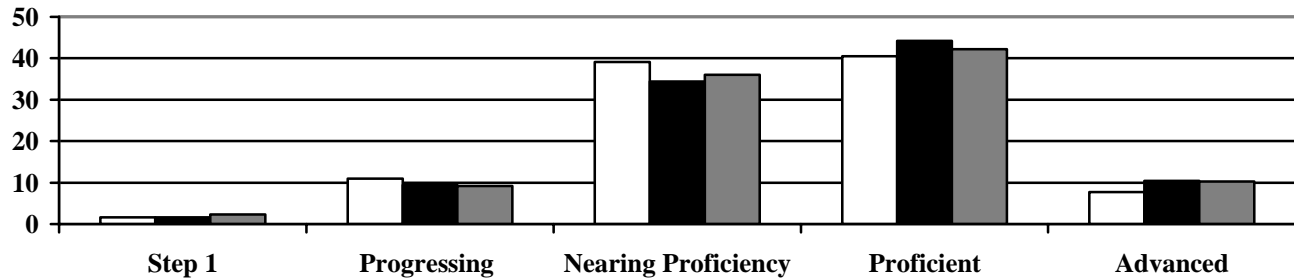
At either end of the spectrum of achievement, the remaining students scored in the outlier categories of Step One and Advanced. During the first year of the expansion project, approximately five percent of students scored in these categories. In the second expansion year, a higher percentage of students scored in the Step One category for all teacher statuses while approximately one percent more students in Mentor-teacher classrooms scored in the Advanced



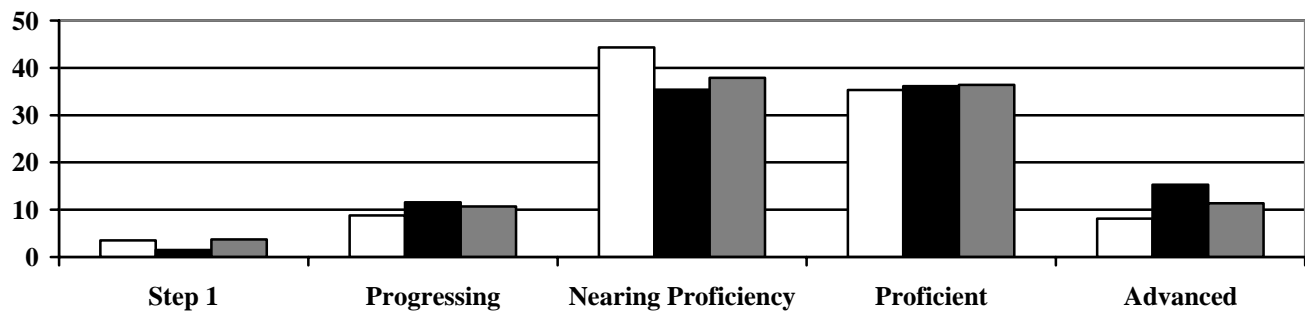
achievement level and fewer students in both Mentored-teacher and non-eMINTS classrooms scored in this category than had done so the previous year.

**Figure 2**  
**MAP Achievement Level Results, Third Grade Science**

Expansion Year FY01



Expansion Year FY02



MAP Achievement Level	eMINTS Mentor Teachers	eMINTS Mentored Teachers	non-eMINTS Teachers	All Teachers
	<i>FY01</i>	<i>FY01</i>	<i>FY01</i>	<i>FY01</i>
Step 1	1.6	1.6	2.3	1.9
Progressing	11.0	9.4	9.2	9.7
Nearing Proficiency	39.1	34.4	36.0	26.4
Proficient	40.5	44.2	42.2	42.3
Advanced	7.7	10.4	10.3	9.7
Total	100.0	100.0	100.0	100.0
Total Number of Students	634	625	1317	2576
P-Value	.061			

**Figure 2 (continued).**

MAP Achievement Level	eMINTS Mentor Teachers	eMINTS Mentored Teachers	non-eMINTS Teachers	All Teachers
	<i>FY02</i>	<i>FY02</i>	<i>FY02</i>	<i>FY02</i>
Step 1	3.5	1.5	3.7	3.3
Progressing	8.8	11.6	10.7	10.4
Nearing Proficiency	44.3	35.4	37.9	38.8
Proficient	35.3	36.1	36.4	36.2
Advanced	8.1	15.3	11.4	11.4
Total	100.0	100.0	100.0	100.0
Total Number of Students	546	457	1669	2672
P-Value	.096			

*Results for Science*

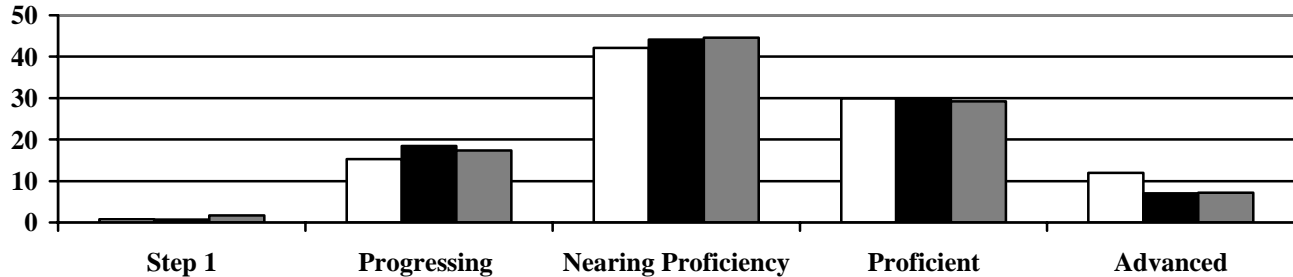
No significant differences exist between eMINTS and non-eMINTS third-grade students on the MAP science test in either expansion year. However, some important differences are apparent between Mentor- and Mentored-teacher classrooms. More students in Mentored-teacher classrooms scored in the Proficient and Advanced categories than students in either Mentor-teacher or non-eMINTS classrooms, with non-eMINTS students scoring higher than Mentor-teacher students. (see Figure 2). In the second year of the expansion program, Mentored-teacher students scored eight percentage points higher than their Mentor-teacher peers and 3.6 percentage points higher than non-eMINTS students.

Looking at the distribution and change in the percentage of students completing the third-grade MAP science test enables the consideration of enrollment in classrooms by status of teacher. In non-eMINTS classrooms the distribution of the percentage of students scoring in each of the five achievement levels of the MAP science test remained relatively consistent between the first and second years of the eMINTS expansion project. Though a small increase occurred in students scoring at the Advanced level between Years One and Two, there was also a small increase in students scoring at the Step One level.

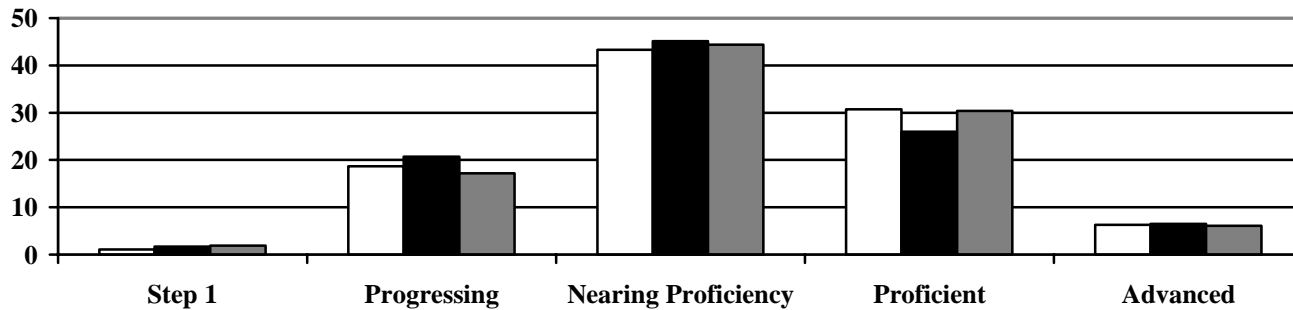
Most interesting to note in the distribution of the percentage of student scores in Mentor-teacher classrooms is the 5.2 percent shift between the Proficient and Nearing Proficiency levels in Year One and the converse in Year Two. During Year Two, fewer Mentored-teacher students scored in the Proficient achievement level, more than 5 percent fewer, while the increase in the Advanced level was fairly nominal – less than one-half of one percent. In Mentored-teacher classrooms, fifteen percent of students scored at the Advanced level during the second expansion year, an increase of approximately five percent from the previous year. However, there was a decrease of approximately eight percentage points between Years One and Two of students scoring at the Proficient level, not all of which is accounted for by the five percent increase at the Advanced level.

**Figure 3**  
**MAP Achievement-Level Results, Fourth Grade Mathematics**

Expansion Year FY01



Expansion Year FY02



MAP Achievement Level	eMINTS Mentor Teachers	eMINTS Mentored Teachers	non-eMINTS Teachers	All Teachers
	<i>FY01</i>	<i>FY01</i>	<i>FY01</i>	<i>FY01</i>
Step 1	0.8	0.7	1.7	1.2
Progressing	15.3	18.5	17.4	17.2
Nearing Proficiency	42.1	44.1	44.6	43.9
Proficient	29.9	29.7	29.2	29.5
Advanced	12.0	7.0	7.2	8.3
Total	100.0	100.0	100.0	100.0
Total Number of Students	649	753	1331	2733
P-Value	.090			

**Figure 3 (continued).**

MAP Achievement Level	eMINTS Mentor Teachers	eMINTS Mentored Teachers	non-eMINTS Teachers	All Teachers
	<i>FY02</i>	<i>FY02</i>	<i>FY02</i>	<i>FY02</i>
Step 1	1.1	1.7	1.9	1.6
Progressing	18.7	20.7	17.2	18.4
Nearing Proficiency	43.3	45.1	44.4	44.3
Proficient	30.7	26.0	30.4	29.3
Advanced	6.3	6.5	6.1	6.2
Total	100.0	100.0	100.0	100.0
Total Number of Students	638	705	1395	2738
P-Value	.057			

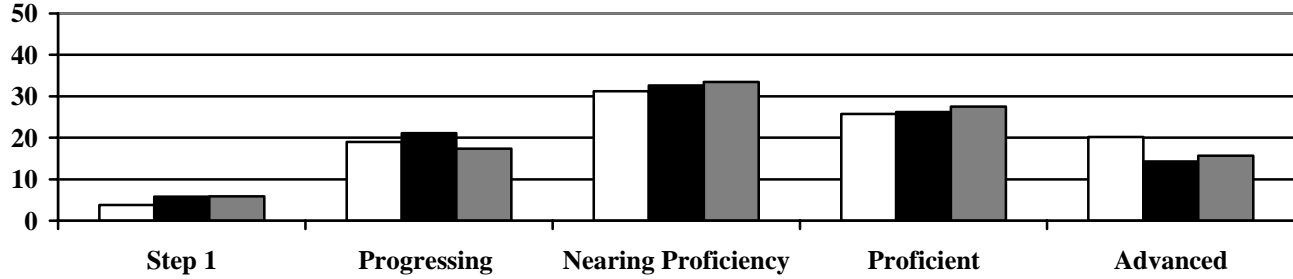
*Results for Mathematics*

In the second year of the expansion project, a near-statistically significant difference exists between non-eMINTS and eMINTS students on the mathematics test. Notable differences in mathematics can be found between the achievements of Mentor- and Mentored-teacher students also. In the first year of the expansion project, approximately five percent more students in Mentor-teacher classrooms scored in the Proficient and Advanced categories than either non-eMINTS or Mentored-teacher students. In the second year of the expansion project, the difference between the percentage of students in non-eMINTS classrooms and the percentage of students in Mentor-teacher classrooms had narrowed. However, the difference between the percentages of Mentor- and Mentored-teacher students scoring in the two highest categories remained at approximately five percent (37.0 and 32.5 percent respectively). It is also worth noting that, like the results of the science MAP test, as great or greater differences exist between Mentor- and Mentored-teacher students as there are between eMINTS and non-eMINTS students in the Proficient and Advanced categories in the second year of the expansion project. (see Figure 3).

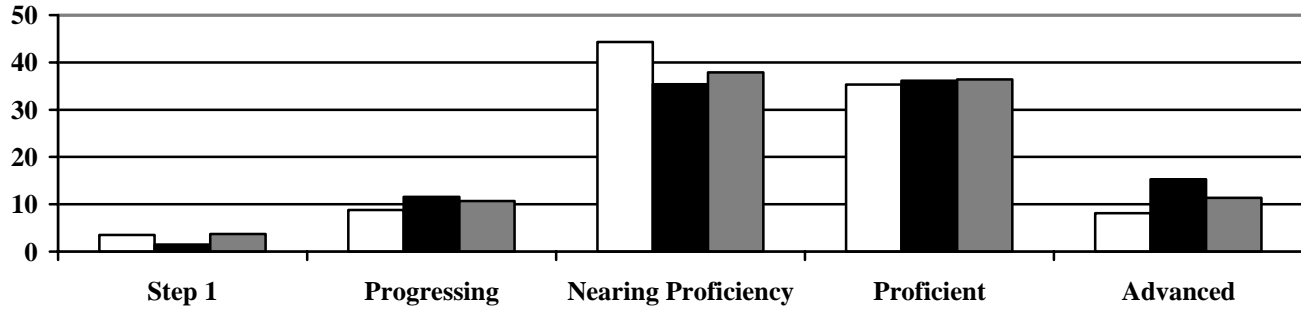
The percentage distribution among students in non-eMINTS classrooms closely approximates a normal distribution as well as remaining meaningfully the same between Years One and Two of the eMINTS expansion project. For students in Mentor-teacher classrooms, approximately half as many scored at the Advanced achievement level in Year Two as in Year One, while the percentage of students whose scores fell in the lowest two achievement levels increased by approximately four percent between expansion years.

For students in Mentored-teacher classrooms, the percentage of students scoring in the two lowest achievement levels, Step One and Progressing, actually increased by more than three percent between Years One and Two. Conversely, more than four percent fewer students scored at the Proficient and Advanced achievement levels in the second expansion year than in the first.

**Figure 4**  
**MAP Achievement Level Results, Fourth Grade Social Studies**  
 Expansion Year FY01



Expansion Year FY02



MAP Achievement Level	eMINTS Mentor Teachers	eMINTS Mentored Teachers	non-eMINTS Teachers	All Teachers
	<i>FY01</i>	<i>FY01</i>	<i>FY01</i>	<i>FY01</i>
Step 1	3.8	5.8	5.9	5.4
Progressing	19.0	21.1	17.4	18.8
Nearing Proficiency	31.2	32.6	33.5	32.7
Proficient	25.7	26.2	27.5	26.7
Advanced	20.2	14.3	15.7	16.4
Total	100.0	100.0	100.00	100.0
Total Number of Students	653	755	1333	2741
P-Value	.079			

**Figure 4 (continue).**

MAP Achievement Level	eMINTS Mentor Teachers	eMINTS Mentored Teachers	non-eMINTS Teachers	All Teachers
	<i>FY02</i>	<i>FY02</i>	<i>FY02</i>	<i>FY02</i>
Step 1	6.1	7.9	5.4	6.2
Progressing	19.2	23.5	19.2	20.3
Nearing Proficiency	27.9	27.3	29.5	28.6
Proficient	25.4	24.9	25.3	25.2
Advanced	21.4	16.4	20.5	19.7
Total	100.0	100.0	100.0	100.0
Total Number of Students	639	684	1379	2702
P-Value	.075			

*Results for Social Studies*

Like the science tests, while the differences between eMINTS and non-eMINTS students on the Social Studies tests were not significant, they did reveal some important differences between the percentages of students in Mentor- and Mentored-teacher classrooms scoring in the bottom two and top two achievement levels of the MAP. During both years of the expansion project, approximately five percent more Mentored-teacher classroom students scored at the Step One and Progressing levels than Mentor-teacher students (see Figure 4). Conversely, approximately five percent more of Mentor-teacher students scored in the Proficient and Advanced categories than Mentored-teacher students. Also worth noting is the consistency of the distribution of students' scores for both Years One and Two.

Slightly more than five percent of non-eMINTS fourth-grade students scored at the Advanced level of the Social Studies MAP test in Years One and Two. However, a smaller percentage of students scored at the Proficient achievement level in the second expansion year than in the first, while the percentage scoring in the two lowest levels increased. This pattern also describes the percentage distribution of student scores in Mentor- and Mentored-teacher classrooms. However, the increase in the percentage of students scoring at the Advanced level was not as great for either status of eMINTS teacher as for non-eMINTS teachers, while the increase in the percentage of students scoring in the lowest levels was greater.

*Summary of Differences in MAP Achievement Levels*

The analysis of MAP achievement levels from the eMINTS expansion schools shows that while weak statistically significant differences do exist in achievement levels between eMINTS and non-eMINTS students on the third-grade Communication Arts test in the first expansion year as well as on the fourth-grade mathematics MAP test in the second expansion year, in general eMINTS classrooms did not demonstrate significantly different distributions of the percentages of students scoring in the five Achievement levels of the Missouri MAP test. Other results of note include the following: more students in eMINTS classrooms consistently scored in the Proficient and Advanced categories than students in non-eMINTS classrooms. However, no consistency exists between the distributions of scores in the Mentor- and Mentored-teacher classrooms. This suggests that neither the mentoring process nor the eMINTS professional

development program can fully explain the differences in student achievement. Additionally, the similarity of patterns in the results for students in both Mentor- and Mentored-teacher classrooms suggests that the mentoring process has had the intended effect of a consistent adoption of eMINTS instructional methods by teachers across time.

### **The Impact of eMINTS Enrollment on Raw MAP Scores**

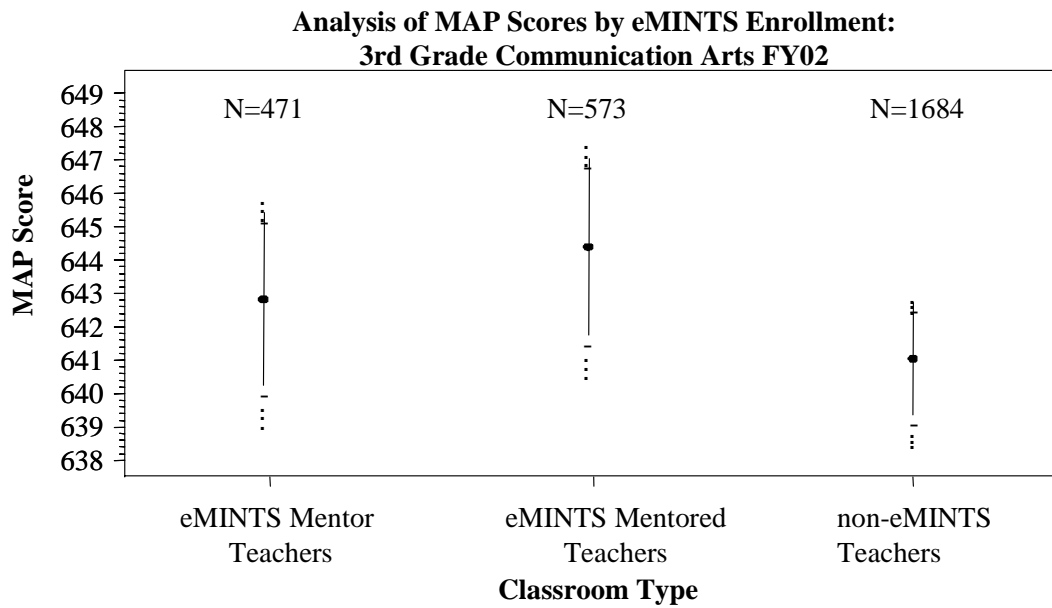
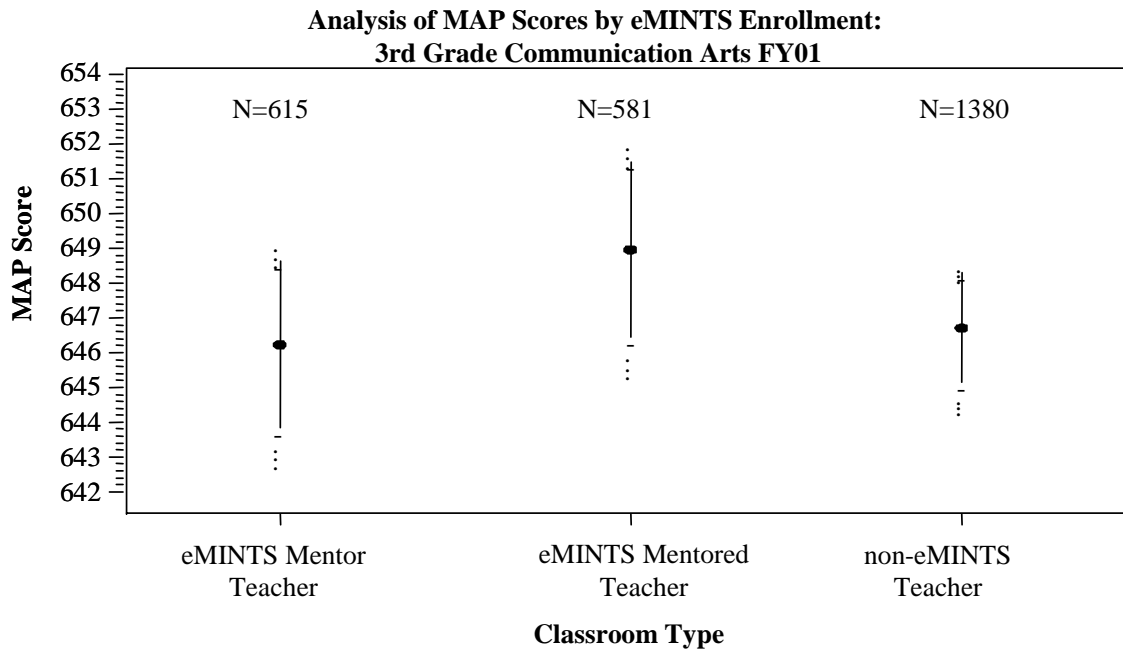
Analysis of raw MAP scores allows for the consideration of the role individual classroom and student characteristics have on test performance. The following analysis considers two general sets of predictors:

- 1) The overall impact of being enrolled in an eMINTS classroom on student performance.
- 2) The relationship between eMINTS teacher status, individual student MAP scores, and classroom instructional practices.

#### *The Overall Impact of eMINTS*

Figures 5 through 8 present results from the analysis of raw MAP scores. Third-grade students in eMINTS classrooms achieved scores statistically different than non-eMINTS students on the MAP science test in the first expansion year. Fourth-grade students in eMINTS classrooms also scored higher than their non-eMINTS peers on the mathematics test in the first expansion year. However, differences in MAP scores between students in eMINTS Mentor- and eMINTS Mentored-classrooms did not reveal a consistent pattern of effect, either when considering changes in the direction or strength of the first and second years of the expansion project or between teacher status within an expansion year.

**Figure 5**  
**Total MAP Score Differences by Type of Teacher**





**Figure 5 (continue).**

	Number of Students		Mean Scores		Standard Deviation		Change in Mean by Time
	<i>FY01</i>	<i>FY02</i>	<i>FY01</i>	<i>FY02</i>	<i>FY01</i>	<i>FY02</i>	
eMINTS Mentor Teachers	615	471	645.99	642.52	30.29	28.59	-3.47
eMINTS Mentored Teachers	581	573	648.73	644.09	31.07	32.33	-4.64
non-eMINTS Teachers	1380	1684	646.48	640.74	29.94	35.17	-5.74
All Teachers	2576	2728	646.87	641.75	30.29	33.54	-5.12

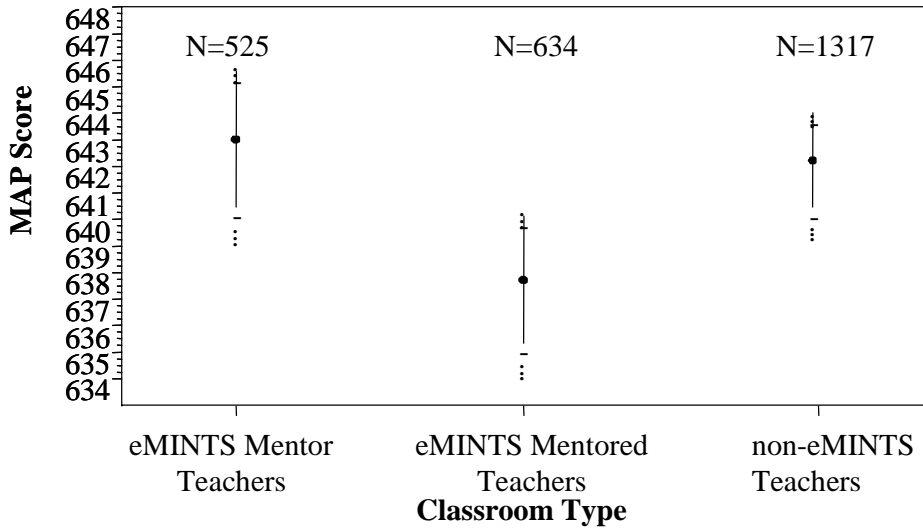
	Difference in Mean by Type		P-Value	
	<i>FY01</i>	<i>FY02</i>	<i>FY01</i>	<i>FY02</i>
eMINTS Mentor Teachers vs. non-eMINTS Teachers	-0.49	1.78	.229	.102
eMINTS Mentored Teachers vs. non-eMINTS Teachers	2.25	3.35		
eMINTS Mentor Teachers vs. eMINTS Mentored Teachers	-2.74	-1.57		

*Results for Communication Arts*

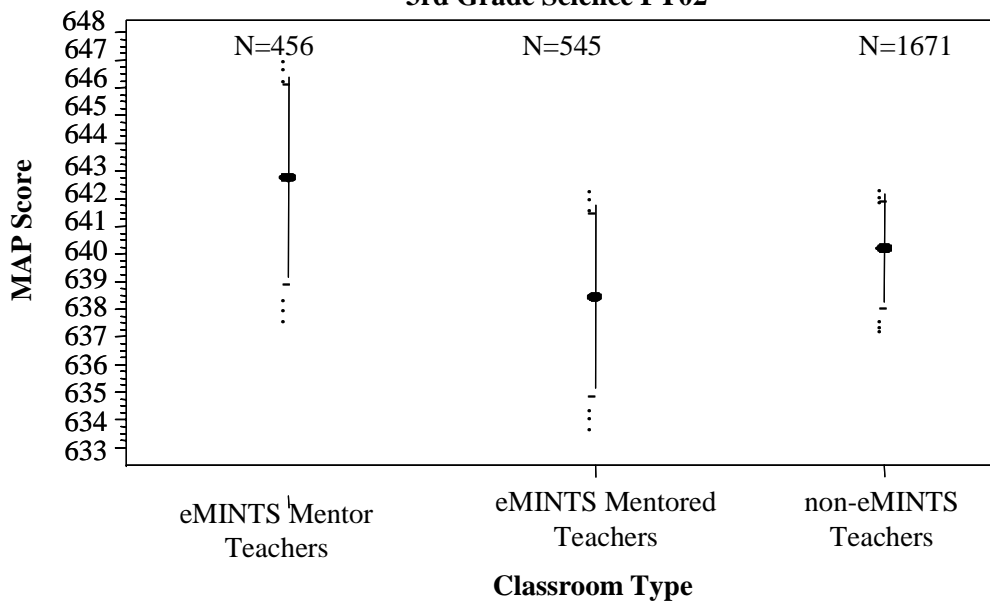
Figure 5 illustrates the outcomes of third-grade students’ MAP scores by eMINTS classroom status. While no statistically significant differences in scores between eMINTS and non-eMINTS students exist, it is interesting to note that students in eMINTS Mentored-teacher classrooms achieved a higher mean score in both Years One and Two than either students in non-eMINTS classrooms or eMINTS Mentor-teacher classrooms. For all students, Communication Arts scores on the MAP were lower in the second year of the expansion project than in the first. On average, non-eMINTS students scored approximately six points lower in Year Two than Year One. The standard deviation between scores for this group also increased by more than five points between Years One and Two with the range in student scores increasing by more than 25 points. Students in eMINTS classrooms scored more consistently between years than non-eMINTS students with the average score of Mentor-teacher students changing by slightly less than 3.5 percent and the average score of Mentored-teacher students changing by approximately 4.5 percent. Standard deviations for eMINTS students were quite small in both Mentor- and Mentored-teacher classrooms – a less than two point change between years.

The consistency of individual eMINTS student MAP score averages on the Communication Arts test can be preliminarily interpreted to suggest that exposure to and integration of the eMINTS technology and instructional practices in classrooms produces consistent results and higher scores for students by both the capacity of students and across time. However, it is important to not overinterpret impacts due to the lack of statistical significance between eMINTS and non-eMINTS classrooms as well as the limitations of only two years of data. On-going analysis of future years of MAP results will provide evidence of lasting impact.

**Figure 6**  
**Total MAP Score Differences by Type of Teacher**  
**Analysis of MAP Scores by eMINTS Enrollment:**  
**3rd Grade Science FY01**



**Analysis of MAP Scores by eMINTS Enrollment:**  
**3rd Grade Science FY02**



**Figure 6 (continue).**

	Number of Students		Mean Scores		Standard Deviation		Change in Mean by Time
	<i>FY01</i>	<i>FY02</i>	<i>FY01</i>	<i>FY02</i>	<i>FY01</i>	<i>FY02</i>	
eMINTS Mentor Teachers	625	456	643.02	642.07	32.43	34.68	-0.95
eMINTS Mentored Teachers	634	545	637.73	637.28	30.55	34.20	-0.45
non-eMINTS Teachers	1317	1671	642.23	638.82	32.88	36.09	-3.41
All Teachers	2576	2672	641.32	639.06	32.27	35.57	-2.26

	Difference in Mean by Type		P-Value	
	<i>FY01</i>	<i>FY02</i>	<i>FY01</i>	<i>FY02</i>
eMINTS Mentor Teachers vs. non-eMINTS Teachers	0.79	3.25	.005	.095
eMINTS Mentored Teachers vs. non-eMINTS Teachers	-4.50	-1.54		
eMINTS Mentor Teachers vs. eMINTS Mentored Teachers	5.20	4.79		

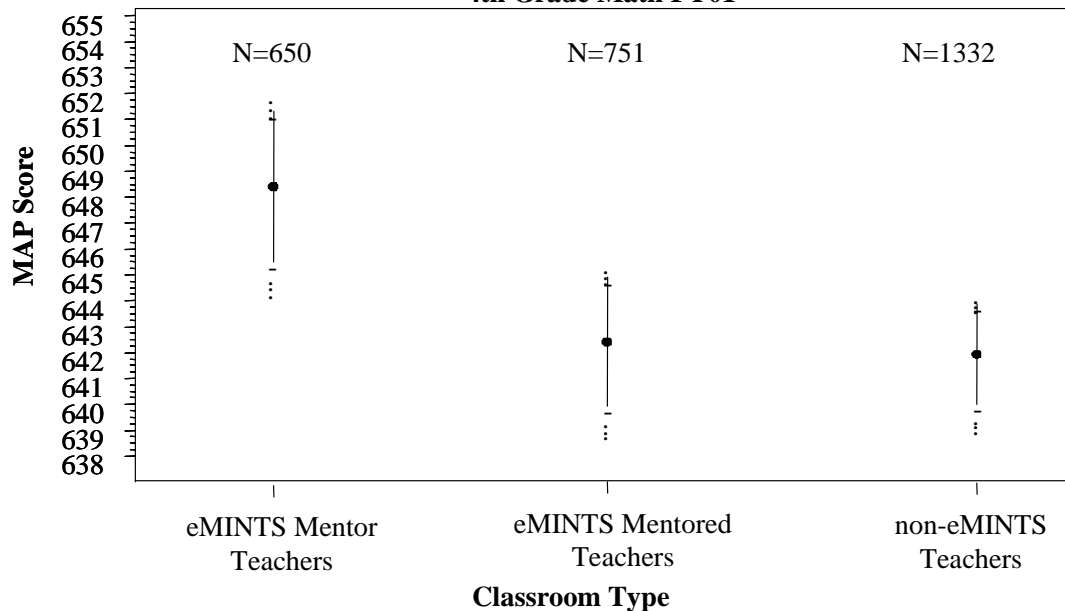
*Results for Science*

As with the Communication Arts test, all third-graders in expansion schools, regardless of classroom type, scored lower in the second year of the expansion program than in the first year, though the decrease for eMINTS classrooms was nominal, less than one point for both Mentor- and Mentored-teacher students. Year One scores show a statistically significant difference between eMINTS and non-eMINTS students. Students in Mentor-teacher classrooms scored higher than students in non-eMINTS as well as students in Mentored-teacher classrooms during both years of testing. For the science MAP test, non-eMINTS students scored higher than eMINTS Mentored-teacher students in both years.

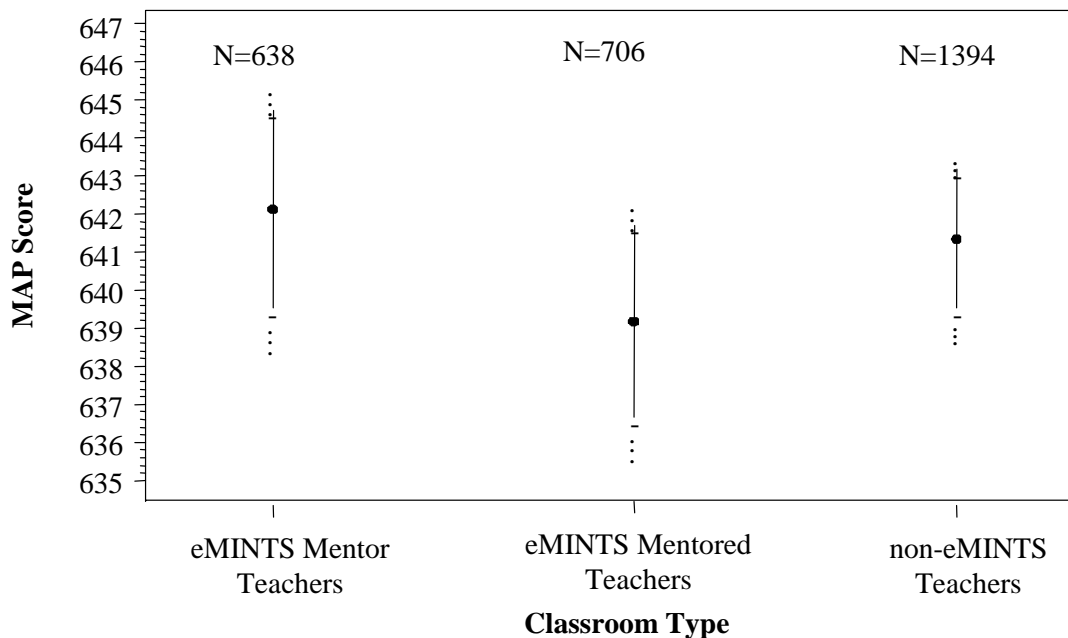
When considering the results of both third-grade tests, the question can be raised as to whether teachers in their first year of eMINTS training are more comfortable adapting the eMINTS model to some subjects more than other subjects and what effect this tendency may have on student performance. As noted previously in eMINTS classrooms, mean scores on the third-grade MAP science test remained virtually unchanged between expansion years. When compared to the more than three-point change for non-eMINTS students during the same period, the prediction that the eMINTS program produces a consistency in teaching and, subsequently, student outcomes is further corroborated.

**Figure 7**  
**Total MAP Score Differences by Type of Teacher**

**Analysis of MAP Scores by eMINTS Enrollment:  
 4th Grade Math FY01**



**Analysis of MAP Scores by eMINTS Enrollment:  
 4th Grade Math FY02**



**Figure 7 (continue).**

	Number of Students		Mean Scores		Standard Deviation		Change in Mean by Time
	<i>FY01</i>	<i>FY02</i>	<i>FY01</i>	<i>FY02</i>	<i>FY01</i>	<i>FY02</i>	
eMINTS Mentor Teachers	650	638	648.90	641.90	37.57	33.51	-7.00
eMINTS Mentored Teachers	751	706	642.16	638.85	34.61	34.16	-3.31
non-eMINTS Teachers	1332	1394	641.73	641.12	35.97	34.62	-0.61
All Teachers	2733	2738	643.56	640.72	36.10	34.25	-2.84

	Difference in Mean by Type		P-Value	
	<i>FY01</i>	<i>FY02</i>	<i>FY01</i>	<i>FY02</i>
eMINTS Mentor Teachers vs. non-eMINTS Teachers	7.17	0.78	.000	.217
eMINTS Mentored Teachers vs. non-eMINTS Teachers	0.43	-2.27		
eMINTS Mentor Teachers vs. eMINTS Mentored Teachers	6.74	3.05		

*Results for Mathematics*

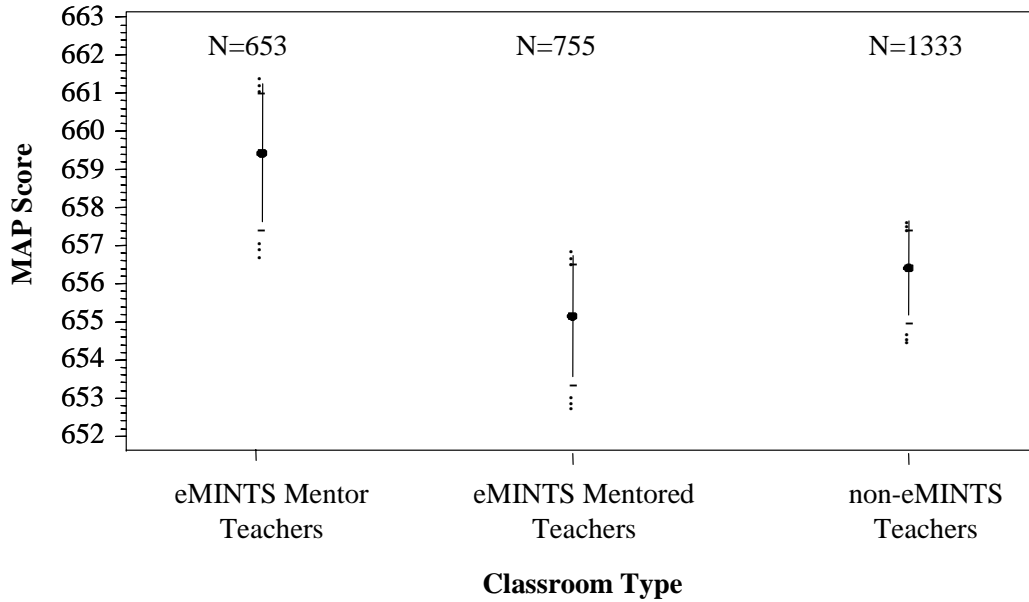
On average, fourth-grade students taking the MAP mathematics test in eMINTS Mentor-teacher classrooms scored higher than either students in Mentored-teacher classrooms or students in non-eMINTS classrooms, resulting in a statistically measurable difference in the first year of the expansion project. As with the third-grade tests, the mean score for all types of classrooms was lower in the second expansion year than in the first. However, the difference in both mean scores and the range of scores among Mentor-teacher students and other students was much larger in the first year of the expansion project than in the second year.

The average score for eMINTS Mentor-teacher students during the first year of the expansion was 6.74 points higher and 7.17 points higher than for Mentored-teacher students and non-eMINTS students respectively. During the second year, Mentor-teacher students averaged approximately three points higher than Mentored-teacher students and slightly less than a point higher than non-eMINTS students, constituting a negligible difference.

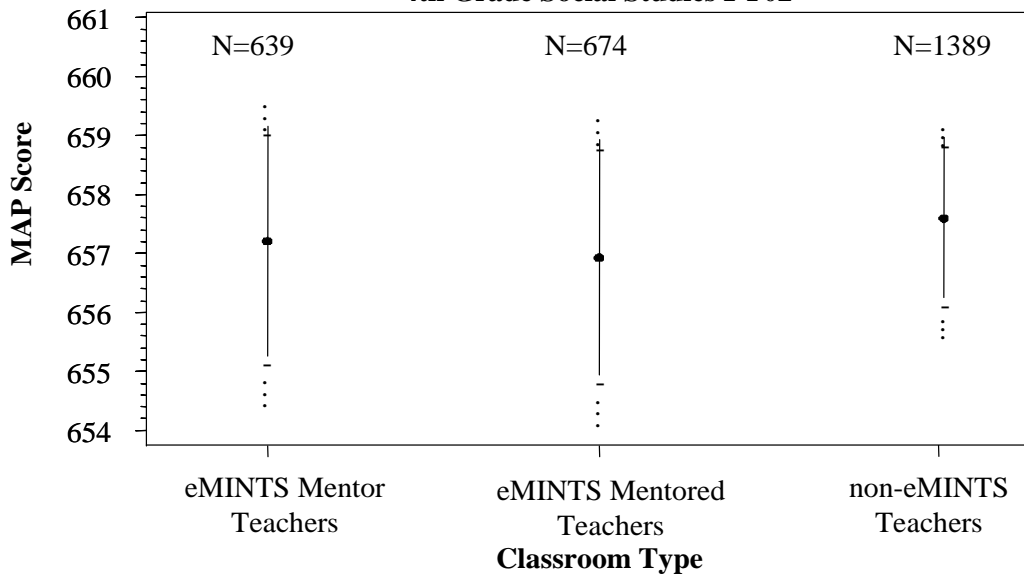
However, unlike the third-grade MAP results, on the fourth-grade MAP mathematics test results showed that non-eMINTS students scored the most consistently between years with a decrease of less than one point in average score between expansion Years One and Two. Mentor-teacher students scored on average seven points lower in Year Two than Year One, while students with Mentored-teachers experienced an overall decrease in average score of approximately three points. Likewise, the standard deviation for Mentor-teacher students grew by more than four points in expansion Year Two, while both Mentored-teacher students and non-eMINTS students experienced a minimal change in the standard deviation between scores.

**Figure 8**  
**Total MAP Score Differences by Type of Teacher**

**Analysis of MAP Scores by eMINTS Enrollment:  
 4th Grade Social Studies FY01**



**Analysis of MAP Scores by eMINTS Enrollment:  
 4th Grade Social Studies FY02**



**Figure 8 (continue).**

	Number of Students		Mean Scores		Standard Deviation		Change in Mean by Time
	<i>FY01</i>	<i>FY02</i>	<i>FY01</i>	<i>FY02</i>	<i>FY01</i>	<i>FY02</i>	
eMINTS Mentor Teachers	648	639	657.59	656.96	23.14	25.09	-0.63
eMINTS Mentored Teachers	756	674	656.18	656.68	21.72	26.31	0.50
non-eMINTS Teachers	1337	1389	656.03	657.35	23.43	25.71	1.32
All Teachers	2741	2702	656.44	657.09	22.90	25.71	0.65

	Difference in Mean by Type		P-Value	
	<i>FY01</i>	<i>FY02</i>	<i>FY01</i>	<i>FY02</i>
eMINTS Mentor Teachers vs. non-eMINTS Teachers	1.56	-0.39	.341	.848
eMINTS Mentored Teachers vs. non-eMINTS Teachers	0.15	-0.67		
eMINTS Mentor Teachers vs. eMINTS Mentored Teachers	1.41	0.28		

*Results for Social Studies*

The results for MAP Social Studies testing reveal no statistically significant differences between students in eMINTS and non-eMINTS classrooms, or between students in eMINTS classrooms with a Mentor or Mentored teachers. Moreover, the differences in average scores by both type of classroom and expansion year are minimal. The largest difference between types of classrooms occurred during the first expansion year with a 1.56 difference in average scores between eMINTS Mentor-teacher students and non-eMINTS students. The change in average scores and standard deviation between the first and second years of the expansion project was also quite nominal with non-eMINTS students scoring an average 1.32 points higher in the second year.

It is worth noting that the fourth-grade MAP Social Studies results are consistent with the third-grade Communication Arts and science MAP scores in that they exhibit a greater consistency among eMINTS students than non-eMINTS students with regard to the change between years in average scores and the standard deviation between scores, further supporting the hypothesis that the eMINTS program enhances learning for all students.

**Table 2**  
**eMINTS Mentor- or Mentored-Teacher Status**  
**by eMINTS Lesson Typology**

		FY01		FY02		% Change
		N	%	N	%	
Mentor	Teacher-Centered	35	30.7	13	28.9	-1.8
	Hybrid	28	24.6	8	17.8	-6.8
	Unfacilitated	--	--	--	--	--
	Facilitated	51	44.7	24	53.3	8.6
	Mentor Total	114	100.0	45	100.0	
<hr/>						
Mentored	Teacher-Centered	67	50.4	9	18.4	-32.0
	Hybrid	36	27.1	14	28.6	1.5
	Unfacilitated	2	1.5	5	10.2	8.7
	Facilitated	28	21.1	21	42.9	21.8
	Mentored Total	133	100.0	49	100.0	
<b>Total</b>		<b>247</b>	<b>100.0</b>	<b>94</b>	<b>100.0</b>	

**The Relationship of eMINTS Teacher Status, Student Average MAP Scores, and Classroom Instructional Practices**

To better understand the impact of the mentoring component of the eMINTS program this section examines the relationship of student average MAP scores and the observation-based placement of classrooms in the eMINTS lesson typology. Evaluators observed both Mentor- and Mentored-teacher classrooms in the springs of the FY01 and FY02 school years (thus, this section cannot compare non-eMINTS classrooms or all classrooms in a building to eMINTS classrooms). eMINTS evaluation team members used the eMINTS lesson typology to classify their observations of classroom lessons. The eMINTS lesson typology describes a set of student, teacher and classroom activities. The typology category assigned to a lesson represents the combination of these activities. Lesson typology categories include Teacher-Centered, Hybrid, Unfacilitated, and Facilitated lessons.

Teacher-Centered lessons are characterized by traditional teaching techniques with little or no input from students in either the content or completion of learning activities. Hybrid lessons contain aspects of both Facilitated and Teacher-Centered lessons. Unfacilitated lessons are often constructed to be inquiry-based, but typically lack clear goals, integrated tasks, and productive teacher oversight. Facilitated lessons can be described as student-centered, inquiry-based, and cooperative in nature. During Facilitated lessons, students have both meaningful input and control over the content and completion of their work. Table 2 displays the classroom typology categories by Mentor or Mentored teachers as well as the percentage change by category between expansion project Years One and Two.



As anticipated, Mentor-teachers lessons fell into desirable categories more consistently than Mentored-teacher lessons during the first and second expansion years. Almost nine percent more Mentor-teachers lessons were described as Facilitated in FY02 than in FY01. Conversely, the percentage of Hybrid and Teacher-Centered lessons observed diminished (-6.8 and -1.8 percent respectively).

Of the Mentored-teachers' lessons observed during FY01, more than fifty percent were described as Teacher-Centered. Slightly more than 27 percent were considered Hybrid lessons, while 21.1 percent and 1.5 percent were classified in the student-centered categories of Facilitated and Unfacilitated. The lessons categorized Teacher-Centered dropped to slightly below twenty percent (18.4 percent) in FY02. The 32.0 percent change was accounted for by significant growth in the percentage of 'Facilitated' lessons observed, an increase of nearly 22 percent. A nearly nine percent increase in Unfacilitated lessons occurred along with a small increase (1.5 percent) in Hybrid lessons.

The following tables compare the average student score for the third- and fourth-grade MAP tests by status of teacher and eMINTS lesson typology. Discussion of the significance and strength of the relationships follow.

**Figure 9**  
**Analysis of MAP SCORES by eMINTS Typology**  
**3<sup>rd</sup> Grade Communication Arts**

		FY01		FY02		Difference
		N*	Mean	N*	Mean	
Teacher-Centered	Mentor	243	649.51	99	653.08	3.57
	Mentored	178	644.28	19	637.21	-7.07
Hybrid	Mentor	223	647.13	172	642.85	-4.28
	Mentored	179	639.03	215	638.99	-0.04
Unfacilitated	Mentor	23	643.35	--	--	--
	Mentored	--	--	19	656.52	--
Facilitated	Mentor	136	647.61	185	642.32	-5.29
	Mentored	214	651.64	297	642.80	-8.84
P-Value		0.1362		0.1188		

\* Students

*Results for Communication Arts*

During the first expansion year, the majority of lessons observed in Mentor teacher classrooms fell into the categories of Teacher-Centered or Hybrid. Students in Teacher-Centered classroom scored, on average, higher than students in classrooms where other lesson types were observed. However, this did not hold true for Mentored-teacher classrooms. The majority of Mentored-teacher lessons were categorized as Facilitated and students in those classrooms scored higher than students in classrooms where lessons were categorized in other categories.

During the second expansion year, the majority of lessons observed in Mentor-teacher classrooms were described as Facilitated and far fewer lessons were categorized as Teacher-Centered. Lessons classified as Hybrid and Facilitated increased in Year Two in Mentored-teacher classrooms also. As is consistent with previously described results, the average score by all lesson types declined in Year Two of the expansion project with the exception of Mentor-teacher classrooms giving lessons described as Teacher-Centered. Teacher status in either expansion year had no statistically significant effect on average MAP Communication Arts scores when considered in the context of the eMINTS lesson typology.

**Figure 10**  
**Analysis of MAP SCORES by eMINTS Typology**  
**3<sup>rd</sup> Grade Science**

		FY01		FY02		Difference
		N*	Mean	N*	Mean	
Teacher-Centered	Mentor	244	646.33	99	659.14	12.81
	Mentored	178	633.95	18	649.67	15.72
Hybrid	Mentor	222	642.57	171	640.93	-1.64
	Mentored	176	634.29	189	632.52	-1.77
Unfacilitated	Mentor	23	632.17	--	--	--
	Mentored	--	--	20	641.25	--
Facilitated	Mentor	136	640.61	187	636.28	4.33
	Mentored	215	644.61	297	637.22	-7.39
P-Value		0.005		0.003		

\* Students

*Results for Science*

Third-grade students in eMINTS classrooms classified as Facilitated, Hybrid, and Unfacilitated classrooms scored lower in Year Two than Year One. However, students in both Mentor- and Mentored-teacher classrooms where a Teacher-Centered lesson was observed scored higher the second year. For both years, a statistically significant relationship exists between average student scores on the MAP science test and Mentor- or Mentored-teacher status.

**Figure 11**  
**Analysis of MAP SCORES by eMINTS Lesson Typology**  
**4<sup>th</sup> Grade Mathematics**

		FY01		FY02		Difference
		N*	Mean	N*	Mean	
Teacher-Centered	Mentor	277	640.11	70	635.29	-4.82
	Mentored	107	639.98	177	640.80	0.82
Hybrid	Mentor	254	638.30	169	638.02	-0.28
	Mentored	116	658.41	--	--	--
Unfacilitated	Mentor	--	--	75	634.32	--
	Mentored	--	--	--	--	--
Facilitated	Mentor	222	649.14	287	640.25	-8.89
	Mentored	426	648.20	416	642.82	-5.38
P-Value		0.0008		0.047		

\* Students

*Results for Mathematics*

Fourth-grade students in classrooms where observed lessons were categorized as Facilitated scored higher than students in classrooms where other types of lessons were observed in both expansion years. The categorization of lessons meaningfully changed between years, particularly in Mentored-teacher classrooms where all lessons were described as either Teacher-Centered or Facilitated in Year Two with Facilitated lessons observed more than twice as often as Teacher-Centered lessons. For both years, a statistically significant relationship exists between average student scores on the MAP mathematics test and Mentor- or Mentored-teacher status.

**Figure 12**  
**Analysis of MAP SCORES by Classroom Typology**  
**4<sup>th</sup> Grade Social Studies**

		FY01		FY02		Difference
		N*	Mean	N*	Mean	
Teacher-Centered	Mentor	276	654.38	70	652.33	-2.05
	Mentored	107	656.21	176	652.66	-3.55
Hybrid	Mentor	257	651.74	168	652.83	1.09
	Mentored	118	658.64	--	--	--
Unfacilitated	Mentor	--	--	74	645.27	--
	Mentored	--	--	--	--	--
Facilitated	Mentor	222	658.89	267	655.37	-3.52
	Mentored	428	659.93	418	661.71	1.78
P-Value		0.0005		0.0001		

\* Students

### *Results for Social Studies*

In Year One of the eMINTS expansion project students of both Mentor- and Mentored-teachers whose observed lessons qualified as Facilitated scored, on average, higher on the MAP Social Studies test than students experiencing other lesson types. Unlike the MAP tests previously discussed, the average scores also increased in Year Two for students in Facilitated lessons. For both years, a statistically significant relationship exists between average student scores on the MAP Social Studies test and Mentor- or Mentored-teacher status.

### **Summary**

Results from the eMINTS expansion project suggest several important conclusions about both the eMINTS program and its attempts to motivate school-wide change. As is consistent with previous eMINTS results, this analysis generally supports the predicted positive impact of enrollment of students in eMINTS classrooms. However, the strength of the impact varied inconsistently across time and tested subject matter. Even more ambiguous are the findings regarding the impact on student performance of being enrolled in an eMINTS Mentor- or Mentored-teacher classroom. These findings do not necessarily suggest that the role of mentoring in the eMINTS professional development is not meaningful. They may, in fact, suggest that at best the mentoring process allows Mentored teachers to more quickly adopt inquiry-based, student-centered strategies and, at worst, that teacher mentoring has no impact on student performance.

First, it is important to note that between the 2001-2002 and 2002-2003 school years, the time period of the expansion project, the overall level of MAP performance in the participating buildings went down slightly. This difference ranged between 0.65 points on the Social Studies test to 5.12 points on the Communication Arts test. The overall reasons for this change are not clear and could be due to anything from changes in the MAP test itself to factors related to the normal progression of cohorts of students through the school. One point that is clear, however, is

that the presence of eMINTS classrooms in the school worked to attenuate these differences. On every test the performance difference between the cohorts of students in eMINTS classrooms was smaller than the difference for students in non-eMINTS classrooms.

When considering the impact of the expansion program itself, i.e., comparing the differences between students in classrooms with Mentor teachers, students in classrooms with Mentored teachers and students in classrooms with non-eMINTS teachers, there is little evidence to suggest that these differences affected student performance in any way. None of the comparisons based on the MAP Performance levels were statistically significant and only two sets even approached significance (Communication Arts in FY01, p-value 0.059, and mathematics in FY02, p-value 0.057). When considering student-level individual MAP scores, there were some significant differences, e.g., science and mathematics in FY01. In those cases students in classes with Mentor teachers scored higher than students in classes with other groups of teachers.

The analysis of differences between Mentor and Mentored teachers in FY01 and FY02 highlights the role of experience in successfully teaching in an eMINTS classroom. In FY01 the Mentor teachers had completed their formal eMINTS professional development and were in the midst of their second or third year of teaching in an eMINTS classroom. In contrast, the Mentored teachers were in the middle of their professional development and had taught in an eMINTS classroom for half a year. In the case of science and mathematics students in classes with Mentor teachers scored higher than students in classes with Mentored teachers in both years, but this difference is smaller in FY02. This suggests Mentored teachers may be gaining in their ability to teach in an eMINTS classroom, especially as they complete their professional development and have time to incorporate eMINTS instructional techniques into their teaching.

The data on instructional practice supports this theory. Student scores on the third-grade MAP science test and the fourth-grade MAP mathematics and Social Studies tests were significantly different for students enrolled in Mentor- or Mentored-teacher classrooms, regardless of the type of lessons. However, little consistency exists within or among MAP tests with regard to which types of lessons experienced the most change in scores over time, which types of lessons related to higher or lower average scores within a year, and whether Mentor- or Mentored-teachers lessons were more or less likely to have lower or higher average scores based on lesson type.

However, these results do not suggest that having a mentor makes the transition into becoming an eMINTS teacher any easier. These results suggest that it takes at least two years of professional development for teachers to become familiar with the student-centered, inquiry-based instructional practices of the eMINTS program. Based on these results, having a school-based mentor does not necessarily speed up the process or the desired results.

When one considers different models of professional development and school change, it appears that providing an informal learning conduit, like providing a mentor, may not enhance the more formal learning process, as represented by the eMINTS professional development. This finding suggests that fostering whole-school change may require a more formalized commitment to reframing instructional practices. In the eMINTS expansion program having an in-school mentor did not demonstrably ease the transition into becoming an eMINTS teacher.