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January 29, 2002

## **Analysis of 2001 MAP Results for eMINTS Students**

This policy brief examines the quantitative impacts of the eMINTS Program on the first cohort of participating classes. The analysis compares 2001 Missouri Assessment Program (MAP) results for eMINTS students and non-eMINTS students in the same school building. eMINTS students scored consistently higher on the MAP than non-eMINTS students. eMINTS students classified as having special needs scored higher than special needs students in non-eMINTS classes. Finally, higher MAP results among eMINTS students were found to be associated with the instructional practices.

### **Introduction**

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

The eMINTS Program is designed to transform the instructional process by supporting elementary teachers as they develop student-centered, inquiry-based instructional practices using a wide range of multimedia and computer technology. 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 is 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 computer 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 high-speed Internet backbone supported by MOREnet.

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<sup>1</sup> Information about the eMINTS Program is available at <http://emints.more.net/>.

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

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

The materials presented here are also available as PowerPoint slides. Contact the eMINTS Evaluation Team for more information.

**Table 1**  
**Basic Statistics for eMINTS Schools**

	<u>Grade 3</u>					
	Number of Classes	<u>Communication Arts</u>		<u>Science</u>		
		Number of Students	Average Class Size	Number of Students	Average Class Size	
eMINTS	25	508	20.3	512	20.5	
non-eMINTS	76	1520	20.0	1541	20.3	
Total	101	2028	20.1	2053	20.3	

	<u>Grade 4</u>					
	Number of Classes	<u>Mathematics</u>		<u>Social Studies</u>		
		Number of Students	Average Class Size	Number of Students	Average Class Size	
eMINTS	60	1328	22.1	1335	22.3	
non-eMINTS	127	2697	21.2	2714	21.4	
Total	187	4025	21.5	4049	21.7	

### **The Report**

This report presents quantitative results of participation in the eMINTS Program. Forty-seven schools in 44 districts participated in the first cohort of the program (FY00). These districts began their participation in the program in the autumn of 1999. The results presented below are based on Missouri Assessment Program (MAP) tests taken by students in the spring of 2001, the end of the first school year when all 85 eMINTS classes were fully installed and operational.

The MAP tests are standards-based assessments administered statewide in grades 3 through 5, grades 7 through 9 and grades 10 and 11. The assessment includes constructed response items and performance events in addition to the more conventional multiple-choice items. The MAP tests in the elementary grades are administered in pairs: tests in Communication Arts and Science in the third grade and Mathematics and Social Studies in the fourth grade.<sup>2</sup>

The results presented here represent the test scores from a total of 6102 third and fourth grade students enrolled in 288 separate classrooms in the eMINTS schools (see Table 1). Of these 288 classrooms, 85 are eMINTS classrooms. The remaining 203 non-eMINTS classrooms constitute the comparison group. Approximately 30 percent of the third and fourth grade students in the participating schools were enrolled in eMINTS classes.

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

Seventy-one percent of FY00 eMINTS classes and 73 percent of eMINTS students were in fourth grade. Individual districts and buildings made all decisions about which classrooms were designated as eMINTS classrooms, which students were enrolled in them and which teachers were chosen to participate in the project. The average class size for third grade classes was approximately 20 students. In fourth grade the average class size was 22 students.

Six of the 47 eMINTS schools used departmentalized instruction in at least one of the third and fourth grades. Eighteen schools formally "looped" students, nine schools kept the class of third grade eMINTS students and their teacher together in fourth grade and nine others assigned all students from the third grade eMINTS class to the fourth grade eMINTS teacher. The impact of these instructional variations will be examined in a later report.

### **Plan of the Analysis**

The analytical focus of this report is on student test performance among students in two large groups of classrooms, eMINTS classes versus non-eMINTS classes. The performance of students enrolled in the eMINTS classrooms is compared with the performance of students not in the eMINTS classroom, but enrolled in the same grade and school. This strategy controls for school characteristics by drawing both the "experimental" group (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 in eMINTS classes to the performance of students not in eMINTS classes allows for the assessment of the general impact of the program.

The analysis also considers the performance of students in three special statuses: special education students, defined as those students with individual education plans (IEPs); students receiving Title I remedial services; and students eligible for the free and reduced lunch program. Information about students with IEPs and students enrolled in the Title I program is taken directly from the MAP tests. Information about eligibility for the free and reduced lunch program is taken from student data provided by participating school districts.

Finally, the analyses will compare three broad groups of eMINTS classes, those classified as being "teacher-centered", "hybrid" and "student-centered, facilitated" using criteria outlined in the *A General Typology of eMINTS Lessons* report.<sup>3</sup> This analysis assesses the general impact of teaching practices on student performance among operational eMINTS classrooms.

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<sup>3</sup> Available on the eMINTS website: <http://www.emints.more.net/evaluation>

### **Three Perspectives on MAP Scores**

This report analyzes total scores on 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 three ways:

- 1) Using the percentage distribution of a five-category Achievement Level scale,
- 2) Using the MAP Performance Index score used by the Missouri School Improvement Program (MSIP) program in assessing performance during district accreditation review and
- 3) Using the raw MAP score.

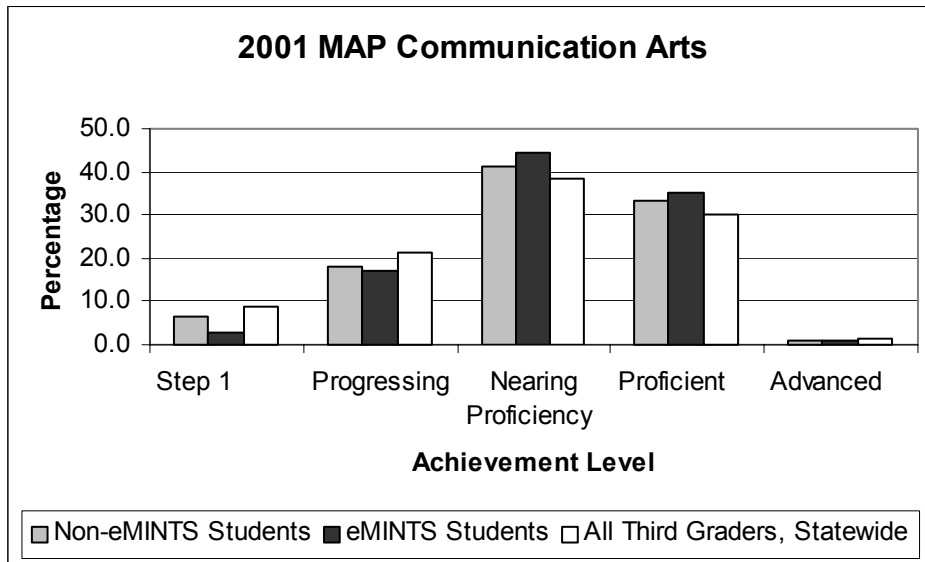
The first two measures are the conventional measures used to assess the performance of school buildings. The raw score allows for the quantitative characterization of individual students and their differences.

### **MAP Achievement Levels**

Individual student performance on the various MAP tests is typically expressed in terms of a five achievement level scale. This scale, "Step 1", "Progressing", "Nearing Proficiency", "Proficient" and "Advanced", provides a general gauge of performance. For buildings the overall percentage distribution of these five achievement levels is used as an aggregate measure of school performance. The analysis below compares all eMINTS classes to the non-eMINTS classes in all participating schools.

The differences in this distribution are presented in Figures 1 to 4. In one test a higher proportion of eMINTS students scored in the "Nearing Proficiency" and "Proficient" categories. On the other three tests a higher proportion of eMINTS students scored in the "Proficient" and "Advanced" categories. These differences were all statistically significant.

**Figure 1**  
**MAP Achievement Level Results, Third Grade Communication Arts**



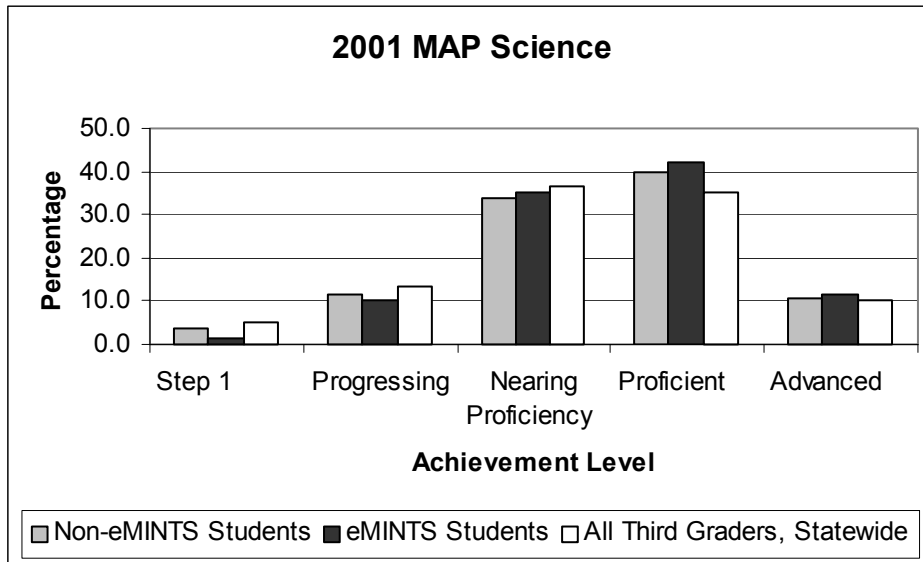
Percent Distribution of MAP Achievement Levels

MAP Achievement Level	Non-eMINTS Students	eMINTS Students	All Third Graders, Statewide
Step 1	6.6	2.6	8.8
Progressing	17.9	16.9	21.4
Nearing Proficiency	41.1	44.5	38.3
Proficient	33.6	35.2	30.2
Advanced	0.8	0.8	1.6
Total Percent	100.0	100.0	100.4
Number of Students	1543	485	70544
P-Value	0.0120		

*Results for Communication Arts*

In the Communication Arts tests, a higher percentage of students enrolled in eMINTS classrooms scored in the "Nearing Proficiency" and "Proficient" categories (see Figure 1). Nearly 45 percent of students in eMINTS classrooms scored in the "Nearing Proficiency" category, compared to 38.3 percent of all third graders statewide. Thirty-five percent of students in eMINTS classrooms scored in the "Proficient" category, compared to 30.2 percent of all third graders. A higher percentage of non-eMINTS students scored in the "Nearing Proficiency" and "Proficient" categories compared to third graders statewide, but this percentage is smaller than that of the eMINTS students.

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



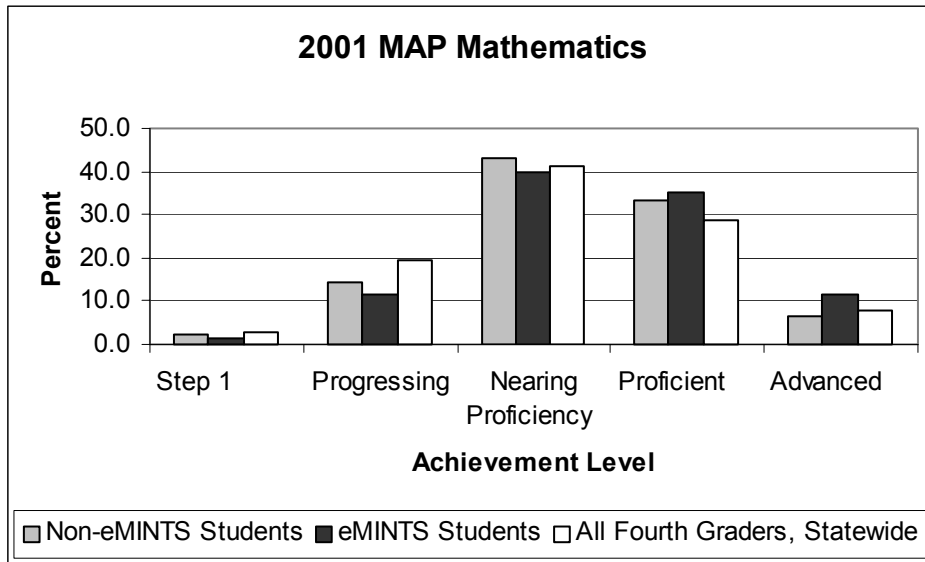
Percent Distribution of MAP Achievement Levels

MAP Achievement Level	Non-eMINTS Students	eMINTS Students	All Third Graders, Statewide
Step 1	3.8	1.2	5.2
Progressing	11.7	10.0	13.4
Nearing Proficiency	33.7	35.2	36.8
Proficient	40.0	42.2	35.2
Advanced	10.7	11.5	10.0
Total Percent	100.0	100.0	100.5
Number of Students	1564	489	70708
P-Value	0.0331		

*Results for Science*

Results on the Science test show a larger percentage of eMINTS students in the "Proficient" and "Advanced" categories in comparison with the state (see Figure 2). Forty-two percent of students enrolled in eMINTS classes scored in the "Proficient" category, compared to 35.2 percent of all third graders. Twelve percent of eMINTS students scored in the "Advanced" category, compared to 10.0 percent of all third graders. As with Communication Arts, more non-eMINTS students scored in the "Proficient" and "Advanced" categories as well.

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



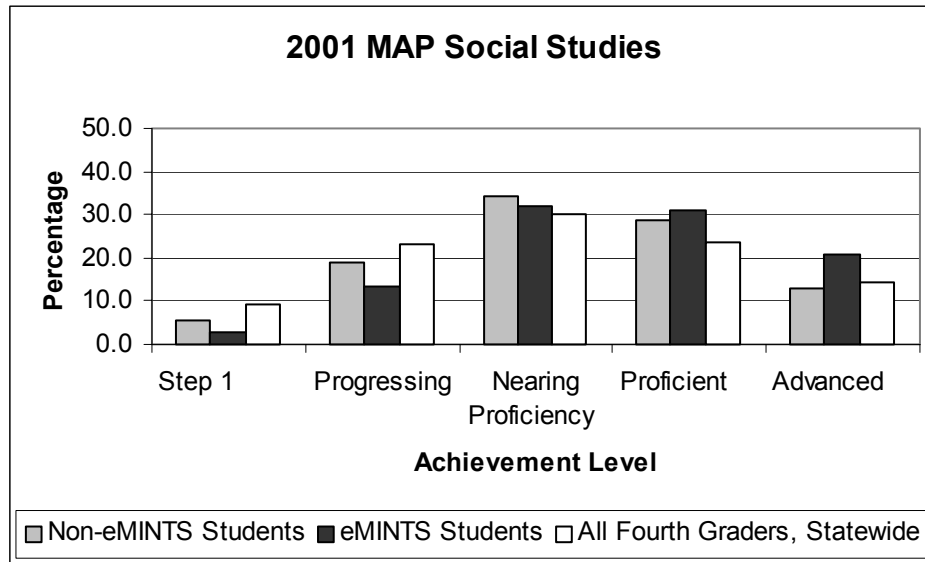
Percent Distribution of MAP Achievement Levels

MAP Achievement Level	Non-eMINTS Students	eMINTS Students	All Fourth Graders, Statewide
Step 1	2.5	1.3	3.0
Progressing	14.6	11.7	19.3
Nearing Proficiency	43.2	39.9	41.0
Proficient	33.2	35.4	28.7
Advanced	6.5	11.7	8.0
Total Percent	100.0	100.0	100.0
Number of Students	2697	1328	70748
P-Value	<0.0001		

*Results for Mathematics*

Results for the Mathematics (see Figure 3) test show that a higher percentage of fourth grade students in eMINTS classes score in the Proficient and Advanced categories compared to all fourth graders, statewide: Thirty-five percent of eMINTS students scored in the "Proficient" category, compared to 28.7 percent of all fourth graders. Twelve percent of eMINTS students scored in the "Advanced" category, compared to 8.0 percent of all fourth graders. Compared to fourth graders statewide more non-eMINTS students scored in the "Proficient" category, but fewer scored in the "Advanced" category.

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



MAP Achievement Level	Non-eMINTS Students (%)	eMINTS Students (%)	All Fourth Graders, Statewide (%)
Step 1	5.3	2.5	9.2
Progressing	18.8	13.6	23.0
Nearing Proficiency	34.3	31.8	30.1
Proficient	28.5	31.0	23.5
Advanced	13.1	21.0	14.2
Total Percent	100.0	100.0	100.0
Number of Students	2714	1335	70710
P-Value	<0.0001		

*Results for Social Studies*

The results for the Social Studies test show that over half of all eMINTS students scored in the "Proficient" or "Advanced" categories (see Figure 4). The percentage of eMINTS students in these two categories is higher than both the group of all fourth graders and the group of non-eMINTS students. The percentage of eMINTS students scoring in the "Advanced" category is 47 percent higher than the percentage of all fourth graders and 60 percent higher than the group of non-eMINTS students.

### *Summary of Differences in MAP Achievement Levels*

This first set of results show that the group of eMINTS students consistently scored higher than the group of all students in the state. In the third grade tests, students enrolled in eMINTS schools but not in eMINTS classes also scored higher than all third grade students statewide. However, in the fourth grade, students in eMINTS scored higher than both the group of all fourth graders and the group of non-eMINTS students. The design of the study, which compares eMINTS and non-eMINTS students in the same schools, controls for school-level influences on student performance, isolates the impact of the eMINTS experience. The difference between eMINTS and non-eMINTS students clearly shows that being enrolled in an eMINTS classroom improves student performance.

**Table 2**  
**MAP Achievement Levels and MAP Performance Index Weights**

MAP Achievement Level	MAP Performance Index Score Weight
Step 1	1.0
Progressing	1.5
Nearing Proficiency	2.0
Proficient	2.5
Advanced	3.0

**Classroom-Level Performance: The MAP Performance Index Score**

The MAP Performance Index score is used to measure district and building-level performance as part of the accreditation review process conducted by the Missouri School Improvement Project (MSIP). This index is a weighted score based on the percentage distribution of students among the levels of the MAP achievement levels.<sup>4</sup> The weights associated with each achievement level are presented in Table 2.

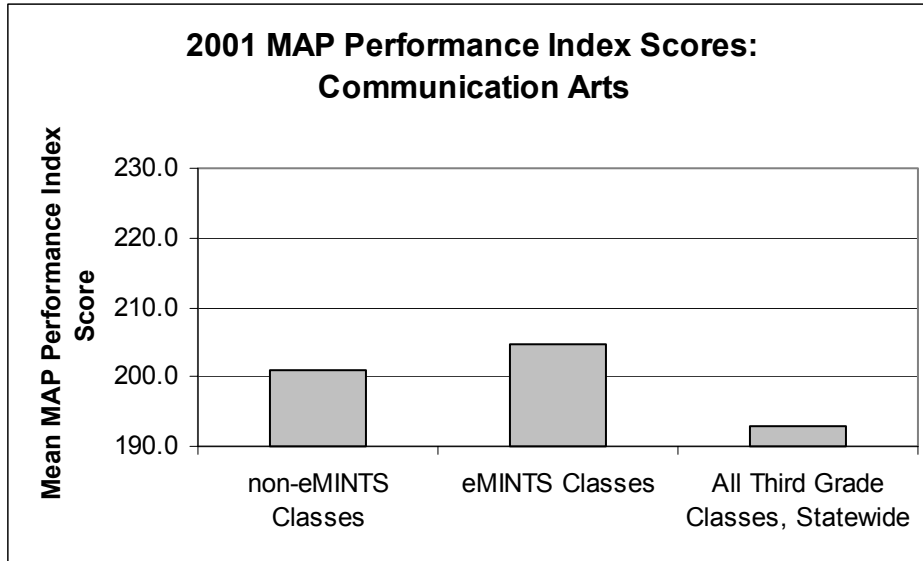
In the MSIP accreditation review the MAP Performance Index score is used as an aggregate measure of district performance. The score is the sum of the individual weights multiplied by the percentage distribution among the achievement levels. This sum is then used as one of several criteria for awarding points for performance in the overall district accreditation review. With the third MSIP cycle, beginning in 2001, this index score is being calculated and applied to the performance of individual school buildings.

The analyses that follow consider the mean MAP Performance Index for the set of eMINTS and non-eMINTS classes. These scores are compared to the MAP Performance Index score for all students and classes statewide. The MAP Performance Index has a range of 100 to 300 points. A MAP Performance Index score of 100 means all of the students in a class were classified at the “Step 1” level of performance, while a score of 300 means that all students were classified at the “Advanced” level.

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<sup>4</sup> See <http://www.dese.state.mo.us/divimprove/sia/msip/3rd%20cycle%20resources.htm> for information about the MAP Performance Index Score.

**Figure 5**  
**Mean MAP Performance Index Score by Classroom Type,**  
**Third Grade Communication Arts**

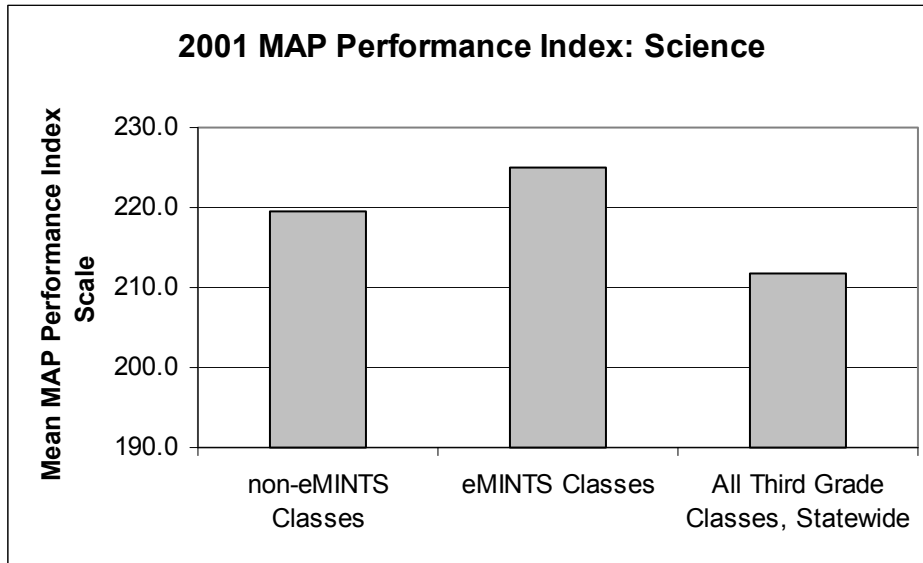


	Number of Classes	Number of Students	Mean	Standard Deviation	P-Value	<i>Difference in Means vs. All Third Graders, Statewide</i>	<i>vs. non-eMINTS Classes</i>
eMINTS Classes	26	508	204.8	13.6	0.2022	11.8	4.0
non-eMINTS Classes	75	1520	200.8	20.8		7.8	
All Classes in eMINTS Schools	101	2028	201.8	19.2		8.8	
All Third Grade Classes, Statewide	3978	70544	193.0	29.0			

*Results for Communication Arts*

The MAP Performance Index score results for the Communication Arts (see Figure 5) show higher scores for the eMINTS classrooms. However, unlike the results for the MAP Achievement levels, the difference between the mean index score for eMINTS and non-eMINTS classes is not statistically significant. Both eMINTS and non-eMINTS classes have index scores higher than the state mean. For eMINTS classes the average score is 11.8 points higher than the average score for all third grade classrooms. For non-eMINTS the average score is 7.8 points higher than the average score for all third grade classrooms.

**Figure 6**  
**Mean MAP Performance Index Score by Classroom Type,**  
**Third Grade Science**

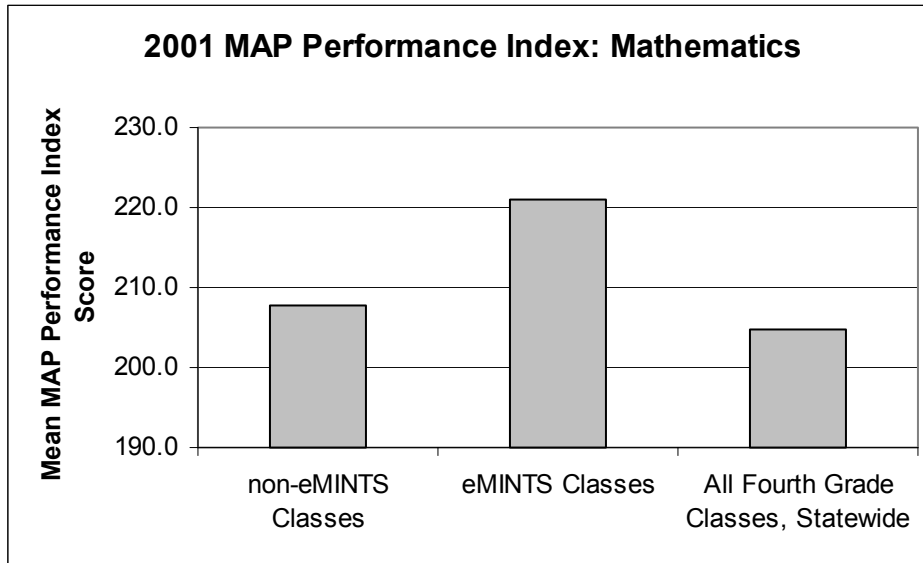


	Number of Classes	Number of Students	Standard Mean	Standard Deviation	P-Value	<i>Difference in Means vs. non-eMINTS Classes</i>	<i>Difference in Means vs. All Third Graders, Statewide</i>
eMINTS Classes	26	512	225.1	13.5	0.1468	5.7	13.4
non-eMINTS Classes	75	1541	219.4	21.7			7.7
All Classes in eMINTS Schools	101	2053	220.9	20.0			9.2
All Third Grade Classes, Statewide	3968	70708	211.7	32.5			

*Results for Science*

Index scores for the Science test show a similar pattern to results for the Communication Arts test (see Figure 6). eMINTS classes have higher average scores than non-eMINTS classes and non-eMINTS classes have higher average scores than all third grade classrooms in the state. As with the Communication Arts the difference between eMINTS and non-eMINTS classes is not statistically significant. Nevertheless, the average score for eMINTS classes is 13.4 points than the average score for all third grade classes.

**Figure 7**  
**Mean MAP Performance Index Score by Classroom Type,**  
**Fourth Grade Mathematics**



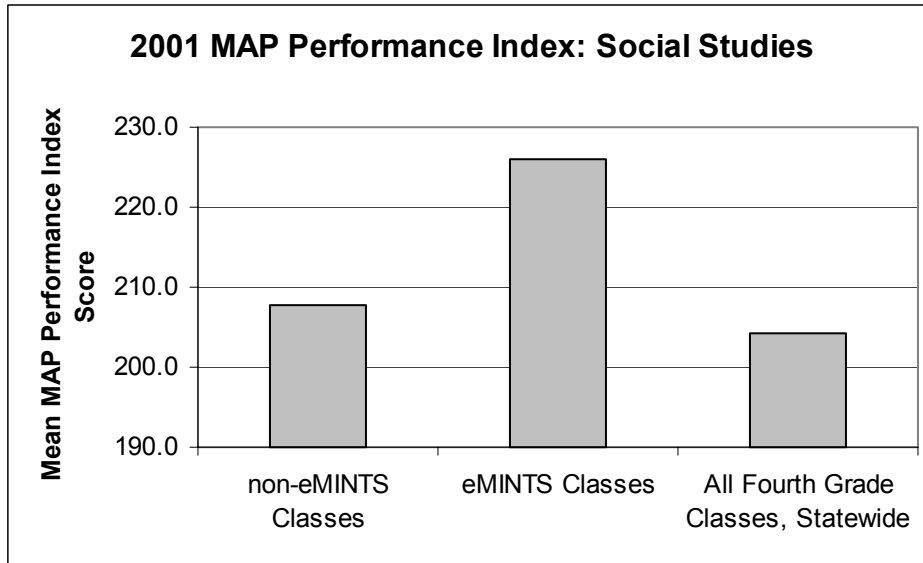
	Number of Classes	Number of Students	Mean	Standard Deviation	P-Value	Difference in Means vs. non-eMINTS Classes	Difference in Means vs. All Fourth Graders, Statewide
eMINTS Classes	60	1335	221.1	19.5	0.0008	13.4	16.5
non-eMINTS Classes	127	2719	207.7	28.7			3.1
All Classes in eMINTS Schools	187	4054	211.9	26.8			7.3
All Fourth Grade Classes, Statewide	3851	70748	204.6	32.3			

*Results for Mathematics*

eMINTS classes have an average MAP Performance Index score 13.4 points higher than non-eMINTS classes. This difference is statistically significant. eMINTS classes also have an average score 16.5 points higher than the average score for all fourth grade classes statewide.

These differences show a substantial positive shift in the distribution of student performance. The performance of the average eMINTS class is at least 13.4 points higher than both the average non-eMINTS class and the average fourth grade in the state.

**Figure 8**  
**Mean MAP Performance Index Score by Classroom Type,**  
**Fourth Grade Social Studies**



	Number of Classes	Number of Students	Mean	Standard Deviation	P-Value	<i>Difference in Means vs. All Fourth Grades, Statewide</i>	<i>vs. non-eMINTS Classes</i>
eMINTS Classes	60	1339	225.9	22.5	<0.0001	18.1	21.6
non-eMINTS Classes	127	2732	207.8	30.8			3.5
All Classes in eMINTS Schools	187	4071	213.6	29.6			9.3
All Fourth Grade Classes, Statewide	3832	70710	204.3	38.2			

*Results for Social Studies*

For eMINTS classes the mean MAP Performance Index score on the Social Studies test is also significantly higher than that of non-eMINTS classes (see Figure 8). The average index score for eMINTS classes is 21.6 points higher than the average for the state and 18.1 points higher than non-eMINTS classes in the same schools.

These results also show a substantial increase in the aggregate performance of students enrolled in the eMINTS classes.

**Table 3**  
**MSIP Criteria for “High” Performing Schools and Average eMINTS Classroom Performance**

Criteria for MSIP "High" Performing Schools		eMINTS Classes	non-eMINTS Classes	All Classes in eMINTS Schools
Communication Arts	211	204.8	200.8	201.8
Science	225	<b>225.1</b>	219.4	220.9
Mathematics	220	<b>221.1</b>	207.7	211.9
Social Studies	211	<b>225.9</b>	207.8	<b>213.6</b>

*Summary of Differences in the MAP Performance Index Score*

The results of the MAP Performance Index analysis show several things. First, the mean MAP Performance Index score for all of the third and fourth grade classes in the eMINTS schools is between 11.8 and 21.6 points higher than the state average. This indicates a substantial positive difference in the overall distribution of student performance compared to the state average.

Secondly, the index score for eMINTS classes is consistently higher than that of non-eMINTS classes. The difference between eMINTS and non-eMINTS classes is statistically significant only in the Mathematics and Social Studies tests, but the increase is at least four points on every test.

As with differences in the overall MAP Achievement Levels, these differences are important given the design of the study. These results show increases among the eMINTS classes in the same schools as the non-eMINTS classes and therefore cannot be attributed to differences between schools. Rather, these increases document the overall positive impact of the eMINTS Program on student performance.

*The Potential Impact of eMINTS on MSIP Accreditation*

The Missouri School Improvement Program awards points for performance based on the MAP Performance Index score. According to the third cycle MSIP procedures, school buildings receive one point on the state performance rubric for each year they increase their MAP Performance Index score by two points in each of the four main MAP subjects. The results of this analysis show that, on average, students in eMINTS classes increased their index scores by at least twice that amount.

School performance levels are also classified by the MSIP in terms of a general criterion of high performance. The criteria are presented in Table 3. The average scores for eMINTS classes are above the threshold for high performance in Science, Mathematics and Social Studies. The performance of students in eMINTS classes raises the average Social Studies score for participating schools above the MSIP high performance criteria.

The results from Figures 5 through 8 show a consistent positive shift in the MAP Performance Index for the eMINTS classes. This increase is both against the average performance of all students in the state and non-eMINTS students in the same school.

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

Analysis of raw MAP scores allows for consideration of the role individual classroom and student characteristics has on test performance. The analysis presented here looks at three general sets of predictors:

1. The overall impact of being enrolled in the eMINTS classrooms on student performance;
2. The impact of enrollment in the eMINTS classrooms on the performance of three groups of students: students with Individual Education Plans (IEPs), students receiving Title I remedial services and students eligible for the free and reduced lunch program; and
3. The general impact of three varieties of instructional practices on student performance for eMINTS students.

#### *The Overall Impact of eMINTS*

The previous analyses demonstrated a positive impact on student participation in the eMINTS Program on the aggregate distribution of MAP achievement levels and performance index scores. One question not yet addressed is the impact of the eMINTS Program on individual student achievement. This is addressed in Tables 4 and 5.

Students in eMINTS classes scored higher than non-eMINTS students on each MAP test. The difference in the mean values is between 4.1 points for the Science test and 7.9 points for the Mathematics test. Each of the differences in Tables 4 and 5 is statistically significant. These differences illustrate the most basic impacts of the eMINTS Programs and do not take any student characteristics into account. As seen in the next section, enrollment in the eMINTS Program has greater impacts for students in a variety of special statuses.

**Table 4**  
**Mean Differences in MAP Scores by eMINTS Enrollment,**  
**Third Grade**

	Number of Students	Mean	Standard Deviation	P-Value	<i>Difference in Means vs. All Third Grade vs. non- eMINTS Students</i>	<i>vs. All Third Grade Students, Statewide</i>
<u>Communication Arts</u>						
eMINTS Students	508	646.2	26.6	0.0010	4.7	7.6
non-eMINTS Students	1520	641.5	30.6			2.9
All Students in eMINTS Schools	2028	642.7	29.7			4.1
All Third Grade Students, Statewide	70544	638.6	31.4			
<u>Science</u>						
eMINTS Students	512	643.7	33.5	0.0218	4.1	7.8
non-eMINTS Students	1541	639.6	37.0			3.7
All Students in eMINTS Schools	2053	640.6	36.2			4.7
All Third Grade Students, Statewide	71673	635.9	38.3			

**Table 5**  
**Mean Differences in MAP Scores by eMINTS Enrollment,**  
**Fourth Grade**

	Number of Students	Mean	Standard Deviation	P-Value	<i>Difference in Means vs. All Fourth Grade vs. non- eMINTS Students</i>	<i>Students, Statewide</i>
<u>Mathematics</u>						
eMINTS Students	1328	650.7	37.0	<0.0001	7.9	9.1
non-eMINTS Students	2697	642.8	35.0			1.2
All Students in eMINTS Schools	4025	645.4	35.9			3.8
All Fourth Grade Students, Statewide	70748	641.6	37.2			
<u>Social Studies</u>						
eMINTS Students	1335	661.6	21.7	<0.0001	6.5	7.1
non-eMINTS Students	2714	655.1	22.3			0.6
All Students in eMINTS Schools	4049	657.3	22.3			2.8
All Fourth Grade Students, Statewide	70710	654.5	24.3			

*The Impact of eMINTS for Special Education Students, Title I Students and Free and Reduced Lunch Students*

When eMINTS teachers describe the impact of the classroom environment on students, many describe great improvement in the work and behavior of students in a variety of special statuses, i.e., special education students, students receiving additional academic support and students with lower social economic status.<sup>5</sup> This section considers differences associated with enrollment in the eMINTS classroom for students identified as receiving special education services (defined as those with an individual education plan, or IEP), students receiving Title I remedial services and students eligible for the free and reduced lunch program. Eligibility for the free and reduced lunch program is the expected proxy measure for family poverty status.

Information about students with IEPs and students receiving Title I services was collected from the student identification codes on the MAP forms. Information about student eligibility for the free and reduced lunch program was taken from student records collected from individual student information systems.

Tables 6 and 7 present the joint distribution of IEP status, participation in the Title I program and eligibility for the free and reduced lunch program. The most common status is eligibility of the free and reduced lunch program. About 40 percent of all students were classified as eligible for this program. In contrast, about 30 percent of third graders and 20 percent of fourth graders received Title I services. Students receiving special education were the least common, fewer than 16 percent of all students were identified as having IEPs.

Relatively few of the students identified in each of these statuses were enrolled in eMINTS classrooms. In the third grade less than one-quarter of the students identified with IEPs were enrolled in the eMINTS classrooms. The same is true for students eligible for the free and reduced lunch program. In contrast, 31 percent of third graders receiving Title I services were enrolled in eMINTS classrooms. Among fourth graders 31 percent of students with IEPs and 31 percent of students eligible for the free and reduced lunch program were enrolled in eMINTS classrooms. About 42 percent of students receiving Title I services were enrolled in eMINTS classes.

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<sup>5</sup> See the *Teacher Perceptions of Student Change in FY00 eMINTS Classrooms* report on the eMINTS website <http://emints.more.net/evaluation>.

**Table 6**  
**Percentage Distribution of Special Student Statuses**  
**Grade 3**

Communication Arts

	non-eMINTS Students	eMINTS Students	All Students	Number of Students
IEP Students	76.9	23.1	14.7	299
Title I Students	68.8	31.2	29.0	589
Free/Reduced Lunch Students	77.0	23.0	45.8	929

Among IEP Students

Title I Students	20.4	42.0	25.4	76
Free/Reduced Lunch Students	54.3	58.0	55.2	165

Among Title I Students

Free/Reduced Lunch Students	58.0	60.3	58.7	346
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Science

	non-eMINTS Students	eMINTS Students	All Students	Number of Students
IEP Students	80.1	19.9	14.7	302
Title I Students	68.9	31.1	28.5	586
Free/Reduced Lunch Students	77.3	22.7	46.0	944

Among IEP Students

Title I Students	18.6	30.0	20.9	63
Free/Reduced Lunch Students	56.6	55.0	56.3	170

Among Title I Students

Free/Reduced Lunch Students	58.7	59.9	59.0	346
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The majority of students classified either as receiving IEPs or receiving Title I services are also eligible for the free and reduced lunch program. In the case of Title I services, this is not surprising. The school-level poverty rate, measured by student eligibility for the free and reduced lunch program, is one criterion for school-wide participation in the Title I program. The joint occurrence of IEP students and students eligible for the free and reduced lunch program is an interesting feature of these data, but this joint occurrence does not impact MAP scores. The interaction between IEP status and eligibility for the free and reduced lunch status is not statistically significant in any of the four MAP subject areas.

**Table 7**  
**Percentage Distribution of Special Student Statuses**  
**Grade 4**

<u>Mathematics</u>	non-eMINTS	eMINTS	All	Number of
	Students	Students	Students	Students
IEP Students	69.2	30.8	14.9	601
Title I Students	56.2	43.8	21.5	866
Free/Reduced Lunch Students	68.2	31.8	37.4	1505
<u>Among IEP Students</u>				
Title I Students	16.3	30.8	20.8	125
Free/Reduced Lunch Students	51.0	52.4	51.4	309
<u>Among Title I Students</u>				
Free/Reduced Lunch Students	50.3	45.6	48.3	418
<u>Social Studies</u>				
	non-eMINTS	eMINTS	All	Number of
	Students	Students	Students	Students
IEP Students	69.4	30.6	15.5	628
Title I Students	58.0	42.0	20.6	835
Free/Reduced Lunch Students	68.4	31.6	37.3	1511
<u>Among IEP Students</u>				
Title I Students	13.3	26.6	17.4	109
Free/Reduced Lunch Students	51.8	50.5	51.4	323
<u>Among Title I Students</u>				
Free/Reduced Lunch Students	50.6	43.6	47.7	398

In the analysis below students in each status are analyzed separately. The set of students in a given category is classified by whether they are enrolled in an eMINTS classroom. Overall, the mean MAP scores for students in these statuses is lower than the mean for students not in that status, e.g., students with IEPs had lower scores than students without IEPs. However, the mean score for the students enrolled in the eMINTS classes is consistently higher than non-eMINTS students, e.g., students with IEPs in the eMINTS classes generally scored higher than students with IEPs who are not enrolled in the eMINTS classes. Frequently the difference between eMINTS and non-eMINTS students in a given status is larger than the difference between all eMINTS and non-eMINTS students. This suggests that teachers' impressions about the benefits of eMINTS instruction for students in special statuses are correct. Apparently, being in an eMINTS classroom has a positive impact on students with special needs.

**Table 8**  
**MAP Score Differences for Students in Special Statuses,**  
**Third Grade Communication Arts**

	Number of Students	Mean	Standard Deviation	P-Value	Difference in Means
<u>IEP Students</u>					
eMINTS Students	69	627.7	19.2	0.0759	5.9
Non-eMINTS Students	230	621.8	27.2		
All IEP Students	299	623.2	28.3		
<u>Title I Students</u>					
eMINTS Students	184	636.8	24.5	0.0297	5.0
Non-eMINTS Students	405	631.8	28.4		
All Title I Students	589	633.3	27.3		
<u>Free/Reduced Lunch Students</u>					
eMINTS Students	214	637.0	25.2	0.1234	3.2
Non-eMINTS Students	715	633.8	30.5		
All Free/Reduced Lunch Students	929	634.6	29.4		
<u>Overall eMINTS-Non-eMINTS Difference</u>					4.7

*Results for Communication Arts*

Table 8 presents results for the Communication Arts test. One of these differences, for students receiving Title I services, is statistically significant. On average, Title I students enrolled in eMINTS classes scored five points higher than non-eMINTS students. The overall increase for eMINTS students with IEPs is five points. This difference is higher than the overall differences between eMINTS and non-eMINTS students (4.7 points).

**Table 9**  
**MAP Score Differences for Students in Special Statuses,**  
**Third Grade Science**

	Number of Students	Mean	Standard Deviation	P-Value	Difference in Means
<u>IEP Students</u>					
eMINTS Students	60	624.5	32.1	0.0402	10.1
Non-eMINTS Students	242	614.4	39.9		
All IEP Students	302	616.4	38.7		
<u>Title I Students</u>					
eMINTS Students	182	634.8	30.0	0.2933	3.1
Non-eMINTS Students	404	631.7	34.0		
All Title I Students	586	632.6	32.8		
<u>Free/Reduced Lunch Students</u>					
eMINTS Students	214	633.5	33.5	0.4192	2.3
Non-eMINTS Students	730	631.3	36.8		
All Free/Reduced Lunch Students	944	631.8	36.0		
<u>Overall eMINTS-Non-eMINTS Difference</u>					4.0

*Results for Science*

Table 9 presents differences on the MAP science test. There are statistically significant differences for students with IEPs. This difference is relatively large. On average students in the eMINTS classes scored 10 points higher than IEP students not in the eMINTS classes.

**Table 10**  
**MAP Score Differences for Students in Special Statuses,**  
**Fourth Grade Mathematics**

	Number of Students	Mean	Standard Deviation	P-Value	Difference in Means
<u>IEP Students</u>					
eMINTS Students	185	623.5	40.3	0.0088	8.9
Non-eMINTS Students	416	614.6	37.2		
All IEP Students	601	617.3	38.4		
<u>Title I Students</u>					
eMINTS Students	379	654.9	41.7	<0.0001	23.8
Non-eMINTS Students	487	631.1	30.6		
All Title I Students	866	641.5	37.8		
<u>Free/Reduced Lunch Students</u>					
eMINTS Students	478	642.5	41.2	<0.0001	10.3
Non-eMINTS Students	1027	632.2	34.0		
All Free/Reduced Lunch Students	1505	635.5	36.7		
<u>Overall eMINTS-Non-eMINTS Difference</u>					7.9

*Results for Mathematics*

Table 10 presents differences for the Mathematics test. On average eMINTS students scored significantly higher than non-eMINTS students across each status. All of these differences are higher than the overall difference between eMINTS and non-eMINTS students. On average, eMINTS students receiving Title I services scored 23.8 points higher than non-eMINTS students receiving Title I services. eMINTS students eligible for the free and reduced lunch program scored 10.3 points higher than non-eMINTS students eligible for the free and reduced lunch program. IEP students in the eMINTS classrooms also scored higher than IEP students not in eMINTS classrooms. Here the difference is 8.9 points.

**Table 11**  
**MAP Score Differences for Students in Special Statuses,**  
**Fourth Grade Social Studies**

	Number of Students	Mean	Standard Deviation	P-Value	Difference in Means
<u>IEP Students</u>					
eMINTS Students	192	650.3	24.8	<0.0001	8.9
Non-eMINTS Students	436	641.5	24.8		
All IEP Students	628	644.2	25.1		
<u>Title I Student</u>					
eMINTS Student	351	660.0	21.0	<0.0001	14.9
Non-eMINTS Student	484	645.1	22.3		
All Title I Students	835	651.3	22.9		
<u>Free/Reduced Lunch Students</u>					
eMINTS Students	477	655.1	23.2	<0.0001	8.5
Non-eMINTS Students	1034	646.6	22.8		
All Free/Reduced Lunch Students	1511	649.3	23.2		
<u>Overall eMINTS-Non-eMINTS Difference</u>					6.5

*Results for Social Studies*

Table 11 presents differences for the Social Studies test. As with the Mathematics test, all of the differences between eMINTS and non-eMINTS students are statistically significant. eMINTS students with IEPs scored 8.9 points higher than non-eMINTS students. eMINTS students receiving Title I services scored 14.9 points higher than non-eMINTS students and eMINTS students eligible for the free and reduced lunch program scored 8.5 points higher than non-eMINTS students. Each of these differences is higher than the overall difference between eMINTS and non-eMINTS students.

*Summary*

The analysis of students in these three statuses shows that enrollment in the eMINTS classes has a positive impact on student MAP scores. The largest and most consistent differences are seen in the fourth grade. Among fourth graders in each of these statuses, eMINTS students' MAP scores were significantly higher than non-eMINTS students. Some of these differences are quite large, e.g., on the Mathematics test eMINTS students receiving Title I services scored 23.8 points higher than non-eMINTS students. Among third graders the differences between eMINTS and non-eMINTS differences are positive, but they are not consistently significant.

**Table 12**  
**Change in Lesson Classifications, FY00 to FY01**  
**Percentage Change**

	FY00		FY01		FY00-FY01	
	Count	Percentage	Count	Percentage	Change	% Change
Teacher-Centered	18	21.2	19	22.4	1	5.6
Hybrid	41	48.2	24	28.2	-17	-41.5
Student-centered, Facilitated	21	24.7	37	43.5	16	76.2
Student-centered, Unfacilitated	5	5.9	5	5.9	0	0.0
Total	85	100.0	85	100.0		

Source: *A General Typology of eMINTS Lessons*, Table 1

These results support the assertion of eMINTS teachers that eMINTS give all students the opportunity to learn. They also suggest that the experience of being in an eMINTS classroom can lessen the typical performance deficit associated with being in these special statuses.

### **Instructional Practices and MAP Performance**

The most visible aspect of the eMINTS Program is the classroom technology: the computers, the interactive whiteboard and the projector. However, most of the time and effort spent creating eMINTS classrooms focuses on instructional practices. eMINTS teachers participate in over 200 hours of professional development training beyond their standard contract. This training is designed to develop an inquiry-based, multidisciplinary, student-centered and facilitated classroom environment.

Part of the evaluation effort has focused on understanding how the eMINTS professional development program has changed instructional activities. To understand the potential of the eMINTS Program, it is essential to understand how teachers have adapted their curriculum delivery and teaching styles to accommodate multimedia technologies and classroom access to the Internet. To this end, the evaluators have developed an extensive typology of instructional practices. This typology places observed lessons in one of four categories including categories for traditional, teacher-centered instruction, a transitional “hybrid” category and a category for the student-centered instruction envisioned by the professional development program.<sup>6</sup> Three of these categories are represented in the analysis below.

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<sup>6</sup> See *A General Typology of eMINTS Lessons* on the eMINTS website for more details about this typology.

**Table 13**  
**MAP Score by Lesson Typology**  
**Third Grade**

	Number of Teachers	Number of Students	Mean	Standard Deviation	P-Value	<i>Differences in Means</i>	
						Teacher-Centered Lessons	vs. non-eMINTS Classes
<u>Communication Arts</u>							
Lesson Classification							
Teacher-Centered	9	196	643.1	25.4	0.0737		1.6
Hybrid	6	112	647.6	25.8		4.5	6.1
Student-Centered, Facilitated	10	200	648.4	27.9		5.3	6.9
All eMINTS Teachers	25	508	646.2	26.6			4.7
Non-eMINTS Teachers	76	1520	641.5	30.6			
<u>Science</u>							
Lesson Classification							
Teacher-Centered	9	197	639.8	31.1	0.0610		0.2
Hybrid	6	114	643.3	33.2		3.5	3.7
Student-Centered, Facilitated	10	201	647.7	35.6		7.9	8.1
All eMINTS Teachers	25	512	643.7	33.5			4.1
Non-eMINTS Teachers	76	1541	639.6	37.0			

Between the first classroom observation in the 1999-2000 school year and the final observation in the 2000-2001 school year, the proportion of teachers observed teaching a student-centered facilitated lesson increased by 76.2 percent (see Table 12). Nearly forty-four percent of teachers were observed conducting student-centered lessons in their last year of participation in the eMINTS professional development program. The analysis below relates student MAP scores to the categories of the lesson typology.

*Results for Third Grade MAP Tests*

Table 13 shows the mean values on the third grade MAP tests by levels of the lesson typology. There are no significant differences by type of lesson on either the Communication Arts or the Science tests. Nevertheless, students in the eMINTS classrooms scored 4.7 points higher than students not in the eMINTS classrooms while students in eMINTS classes scored 4.1 points higher on the Science test.

**Table 14**  
**MAP Score by Lesson Typology**  
**Fourth Grade**

Lesson Classification	Number of Teachers	Number of Students	Mean	Standard Deviation	P-Value	<i>Differences in Means</i>	
						Teacher-Centered Lessons	vs. non-eMINTS Classes
<u>Mathematics</u>							
Teacher-Centered	17	330	646.6	38.4	<0.0001		3.8
Hybrid	16	433	646.4	33.9		-0.2	3.6
Student-Centered, Facilitated	27	565	656.4	37.8		9.8	13.6
All eMINTS Teachers	60	1328	650.7	37.0			7.9
Non-eMINTS Teachers	127	2697	642.8	35.0			
<u>Social Studies</u>							
Teacher-Centered	17	334	659.6	22.5	<0.0001		4.5
Hybrid	16	432	658.3	22.8		-1.3	3.2
Student-Centered, Facilitated	27	569	665.4	19.8		5.8	10.3
All eMINTS Teachers	60	1335	661.6	21.7			6.5
Non-eMINTS Teachers	127	2714	655.1	22.3			

*Results for Fourth Grade*

Results for the fourth grade tests show statistically significant differences by lesson classification. In both cases, students observed in student-centered, facilitated lessons scored significantly higher than students observed in either teacher-centered or hybrid lessons. On the Mathematics tests students observed in student-centered, facilitated lessons scored ten points higher than other eMINTS students and 13.6 points higher than non-eMINTS students.

A similar situation is seen with the Social Studies test. Here students observed in student-centered, facilitated lessons scored 5.8 points higher than students observed in teacher-centered lessons and 7.1 points higher than students observed in hybrid lessons. Students observed in student-centered, facilitated scored 10.3 points higher than non-eMINTS students.

## **Summary**

These results show positive effects of inquiry-based, student-centered instructional practices. For the two fourth grade MAP tests, student observed in student-centered facilitated lessons scored significantly higher than all other eMINTS students.

These results underscore important differences in instructional practices. Teacher-centered lessons typically present subjects discretely, with the teacher controlling the educational content. Student-centered, facilitated lessons are more likely to be multidisciplinary and project-based. In these lessons student have to manage, digest and synthesize information independently while the teacher supports, rather than dictates, the intellectual work. Clearly, students in a student-centered, facilitated environment are more accustomed to the higher-order thinking and reasoning tasks they encounter on the constructed response items and performance events incorporated into the MAP.

Based on the information in Table 12, it is clear that the eMINTS professional development helps foster instructional practices that, in turn, prepare students to perform well on the MAP test. At the end of the first year of the eMINTS professional development program, 21 teachers were observed leading student-centered facilitated lessons. At the end of the second year, 37 teachers were observed leading student-centered facilitated lessons. The results from the MAP test show that students learning in student-centered, facilitated environments out-perform students in other learning environments.

The impact of instructional practices is seen in the fourth grade tests, Mathematics and Social Studies. Why there are significant differences among the fourth grade eMINTS classes but not in the third grade eMINTS classes is unclear. Several third grade eMINTS teachers mentioned that not all of their students were developmentally prepared for the extensive inquiry-based curriculum found in the eMINTS classroom. Unfortunately, the individual-level data necessary to assess the teachers' observations does not exist. What is clear is that, among third graders, enrollment in an eMINTS class has an average positive impact of nearly five points on the MAP tests. It is also clear that, among fourth graders, student-centered facilitated instructional practices provide an additional increase in student performance. The size of this increase is between ten and thirteen points over the MAP scores of students in non-eMINTS classes.

## **Conclusions**

The results of this analysis consistently show a positive impact of the eMINTS classes on MAP scores. This impact is seen in aggregate achievement levels, in the MAP Performance Index and individual student test scores. The results of the achievement levels and MAP Performance Index show positive changes in the overall distribution of scores associated with enrollment in the eMINTS classes. However, the most detailed assessment of the impact of the eMINTS Program is seen in the individual test scores.

Analysis of individual test scores show that students in special statuses, special education students, Title I students and students eligible for the free and reduced lunch program

show substantial increases in their MAP scores when enrolled in eMINTS classrooms. It was also shown that fourth grade students observed in “student-centered” lessons generally perform better than students observed learning under more traditional, teacher-centered circumstances. At the very least, this analysis demonstrates that all students can learn and that inquiry-based, student-centered instruction helps students to master the types of questions on the MAP assessment.

The differences between eMINTS and non-eMINTS students are seen most clearly in the fourth grade. eMINTS students in the fourth grade scored higher than non-eMINTS students in every analysis. In contrast, third grade eMINTS students scored consistently higher than non-eMINTS students, but few of these differences were statistically significant.

There are few statistically significant differences in performance on the Communication Arts test. On average, eMINTS students score 4.7 points higher than non-eMINTS students and there are significant differences in the distribution of MAP Achievement levels and for Title I students, but there are no significant differences in the MAP Performance Index or by lesson type. This is a surprising result, especially given the importance of reading in working with materials off the Internet. A future analysis will look at student scores in Communication Arts in more detail.

There were more significant differences on the Science test. Special education students in the eMINTS classes scored 10.1 points higher than non-eMINTS special education students. However, as with the Communication Arts test, there is not a statistically significant effect associated with instructional practices.

In contrast, every analysis of the fourth grade tests, Mathematics and Social Studies, shows statistically significant positive differences due to being enrolled in an eMINTS classroom. Some of these differences are remarkable. For example, among Title I students, enrollment in an eMINTS class increase their Mathematics score by an average of 23.8 points than other Title I students. The difference for Title I students on the Social Studies test is also large; on average they score 14.9 points higher than non-eMINTS students receiving Title I services. There are similar increases in Mathematics and Social Studies for students receiving special education services and students enrolled eligible for the free and reduced lunch program.

It is also notable that fourth grade eMINTS students observed in student-centered, facilitated lessons out-perform students observed during other types of lessons. In Mathematics the difference between student-centered, facilitated lessons is nearly 10 points, while these students scored 13.6 points higher than students in non-eMINTS classes in the same schools. The results for Social Studies are similar; the difference between students observed in student-centered, facilitated lessons versus other lessons is 5.8 points higher than students observed in teacher-centered lessons and 7.1 points higher than students observed in hybrid lessons. Students observed in student-centered, facilitated lessons scored 10.3 points higher than non-eMINTS students.

The general impact of instructional practices is statistically significant only for the fourth grade tests, Mathematics and Social Studies. Why this is the case may have more to do with the developmental abilities of third grade students than with the essential characteristics of either the eMINTS Program or the MAP test. Understanding why there would be such large differences associated with student-centered, facilitated lessons among fourth grade students, as large as ten points on the Mathematics test and not among third graders, where the largest difference is slightly less than eight points on the science test, is beyond the scope of this analysis.

This is the first of several analyses based on the 2001 MAP database for the eMINTS project. The phenomena described here are complex and at their best, these analyses can only demonstrate differences and help frame future questions about what is happening in eMINTS classrooms. However, two things are clear. First, eMINTS has a positive impact on student achievement; this is seen on each of the four MAP tests administered in third and fourth grade. Second, the impact of the eMINTS Program is transmitted through instructional practices and enhanced by the integration of multi-media computing technology into the classroom. This is seen most clearly in fourth grade, where student-centered facilitated lessons helped students outperform both non-eMINTS students and eMINTS students in classrooms characterized by other types of lessons. Why one would see these differences in fourth grade and not third grade is a question that deserves investigation. Nevertheless, it is clear that eMINTS works.