Results for District One

District One is a large district in St. Louis County with an enrollment (in grades Prekindergarten through 12) of approximately 12,000 students. The breakdown of student racial/ethnic backgrounds is: approximately 80% Black/African American; 18% White/Caucasian; 1% Hispanic; and less than 1% Asian. There are three middle schools in this district, and each serves students in grades 7 and 8.

Course and standardized test score data was provided for 587 students who completed middle school in 2010 and who had attended both years of middle school in the district; of these, 333 (57%) had taken at least one fine arts class during their seventh or eighth grade years.

Altogether, these 333 students took more than 883 arts courses during middle school for an average of 2.6 classes per student. Of all the arts courses taken, nearly three-quarters (72%) were music classes, mostly choir and band, but also including orchestra and music appreciation. Twenty-four percent of the classes were in visual art, and 4% were drama classes.

In order to test the relationship between the number of arts courses taken and standardized (MAP) test scores, students were divided into three groups, depending upon the number of arts classes they took.

- 254 students did not take arts courses; they comprise Group One.
- 160 students took one or two arts courses (103 took one course, while 57 took two); they form the second group.
- 126 students took three to six arts courses (with 47 taking three courses, 107 taking four courses, 17 taking three courses, and 2 students taking four fine arts courses); they are in Group Three.
Students in Groups One and Three were selected for comparison. MAP scores in Communication Arts and Math were available for analysis, beginning with 2008 scores as a baseline, from the year before students began middle school. The graphs below show comparisons of scores for these two groups.

Both Groups 1 and 3 showed improvement in their average Communication Arts scores from their sixth grade year to their eighth grade year. Group 3 (the students who took three or more arts classes) started out in 2008 with an average score that was approximately 24 points higher than Group 1. By 2010, their average score was 28 points higher than students who had only taken one arts class. That is, their rate of improvement in Communication Arts was higher than the rate of improvement for students who had not taken fine arts courses. Although this difference appears to be modest, it is statistically significant, meaning that the likelihood that the results are due to chance alone is very low1.

A similar pattern is evident for average Math scores. In 2008, Group 3 students had an average Math score that was about 27 points higher than the average score for Group 1; by 2010, this difference had increased to 28 points. Again, although the difference is modest, it is statistically significant.

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1 For this analysis, the probability that results are due to chance alone is less than 5 chances out of 100.
When examining differences for students who were African American and students who were White, changes in Math according to whether or not students took arts electives were statistically significant for both groups; however, changes in Communication Arts were more pronounced for White students. That is, taking arts courses was more strongly associated with improvement in Communication Arts scores for White students than it was for African Americans.

Regarding differences in standardized test score improvements by student gender, boys who took fine arts courses showed more improvement over time than boys who did not take arts classes. These differences are definitely stronger for boys than for girls in both Math and Communication Arts. As shown in the graph below, boys in Group 3 (who had taken 3 or more arts courses) had Communication Arts scores in 2008 that, on average, were about 26 points higher than boys who took no arts electives. By 2010, the boys who had studied the arts scored 36 points higher than the others. Similar results were not observed for female students.
As shown in the graph on the next page, similar results were observed for changes in Math scores. That is, boys who took fine arts electives showed more improvement in their Math scores than boys who did not take arts classes. Boys in the arts group scored 34 points higher in Math in 2008; in 2010, they scored a striking 50 points higher than the boys who did not take fine arts electives. Again, these differences were not observed for girls.
Summary

To help summarize these analyses, and to display the results in another format, the graph below shows the Communication Arts change scores for students overall, for African American and White/Caucasian students, and for boys and girls\(^2\). Change scores were computed by subtracting the beginning scores (2008 scores) from the final scores (2010) to show the magnitude of improvement over the three years (including 6\(^{th}\) grade, the year before middle school in this district, and the 7\(^{th}\) and 8\(^{th}\) grade years).

The graph shows the following:

- Improvement in average Math scores (represented by the change score) was higher for students in Group 3 (who had taken arts electives) than for the students in Group 1 (who had not taken arts classes)\(^3\).
- While both Black/African American and White/Caucasian students took arts electives showed more improvement in Communication Arts scores as compared to students who did not take arts classes, the change from 2008 to 2010 was more pronounced for White students\(^4\).
- Boys who took arts courses showed much more improvement in Communication Arts scores than boys who did not. Surprisingly, girls who didn’t take arts scores showed less improvement than the girls who took fine arts electives; however, this difference is not statistically significant, meaning that the difference could be due to chance alone\(^5\).

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\(^2\) Although analyses were also conducted to examine differences by fee/reduced price lunch status, there were no statistically significant differences between Groups 1 and 3 based on this factor.

\(^3\) There were 254 students in Group 1 and 173 students in Group 3; the difference between the change scores is statistically significant (p<.05).

\(^4\) There were 213 African American students in Group 1 and 135 African American students in Group 3. The improvement in communication arts scores for these students is not statistically significant. The number of White students was much lower – 34 students in Group 1 and 35 in Group 3. The improvement for White students is statistically significant (p<.05).

\(^5\) There were 151 boys in Group 1 and 86 boys in Group 3. The difference in change scores for these two groups is statistically significant (p<.001). While there were 103 girls in Group 1 and 87 in Group 3, the difference in average communication arts scores between these 2 groups is not statically significant.
Results were similar in terms of improvement (change) scores in Math:

- Among all students, those who took arts electives showed more improvement from 2008 to 2010 than students who did not take fine arts classes.\(^6\)
- African American students who elected to study the arts showed more improvement in Math than those who did not take fine arts classes. The same is true for White students.\(^7\)
- Taking arts classes has a stronger relationship to improvement in Math scores for boys than it does for girls.\(^8\) In fact, girls who took arts electives showed less improvement in Math than girls who did not study the fine arts; however, this latter difference is not statistically significant.

\(^6\) The number of students in each group is the same as for the analysis of communication arts change scores (see Note 3). The difference in Math improvement between Groups 1 and 3 is statistically significant (p<.01)

\(^7\) The difference in change scores is statistically significant for both groups (for African Americans, p<.001; for Whites, p<.05).

\(^8\) This difference is highly statically significant (p<.001).
Overall, results show that in this urban, mostly African American school district in which the majority of students are eligible for free/reduce price lunch, participation in fine arts electives is significantly related to improvement in standardized test scores in Communication Arts as well as Math.

Interestingly, the relationship between taking fine arts electives and test score improvement is particularly strong for boys, whose scores in both Math and Communication Arts lagged well behind girls in 2008. However, by the time they graduated from middle school, boys on average outscored girls in Communication Arts, and essentially caught up with girls in Math. It could be that taking more arts courses was more beneficial for boys because the arts address some of the learning differences that have been observed by student gender.

It is worth noting that students who took fine arts classes had, on average, significantly higher test scores to begin with than their peers who did not take arts electives. It could be argued that these students were on a different score improvement trajectory (that is, more likely to show score improvement) than the other students to begin with; however, it could also be possible that these students were more engaged with the arts before 2008, and that this engagement contributed to higher academic achievement prior to middle school. Having additional longitudinal data for these students might have supported one of these conclusions over the other.

On average, students in both groups (arts and non-arts) showed improvement in standardized test scores over time, and some of the differences in change scores between the two groups were relatively modest. Nevertheless, because the growth was measured over three years...
only; if scores were tracked into high school as well, and students in the arts group continued to take more drama, music and art classes than other students, the rate of improvement could be even greater.

As in other, similar studies of the impact of arts education on student academic achievement, these results do not necessarily suggest that participation in fine arts classes causes more improvement in Math and Communication Arts scores, but they do suggest that arts education contributes to academic performance in this particular school district.
Results for District Two

District Two is a much smaller district in St. Louis County with an enrollment (in grades Prekindergarten through 12) of approximately 5,000 students. The breakdown of student racial/ethnic backgrounds is: approximately 77% White/Caucasian; 15% Black/African American; 3% Hispanic; 2% Asian; 3% Multi-racial and less than 1% Indian/Native American. There are two middle schools in this district, and each serves students in grades 6, 7 and 8.

Course and standardized test score data was provided for 404 students who completed middle school in 2011. In this district, students can take electives on a rotating basis, including electives in the fine arts, that are taken for shorter time periods and earn students less than a full credit for class completion. Thus, credits for fine arts classes in this district range from .17 to 1.00 per course, and nearly all students take at least one rotation of an art, music, or drama class.

Altogether, these students completed more than 708 credits in the fine arts during middle school for an average of 1.8 credits per student. Of all the arts credits earned, the majority (60%) were music classes. Twenty-five percent of the credits were earned in visual art, and 15% were drama credits.

As with District One, to test the relationship between the number of arts credits and standardized (MAP) test scores, students were divided into three groups:

- 129 students earned from .5 to 1.3 fine arts credits; they comprise Group One.
- 134 students earned 1.5 to 2.0 credits; they form Group Two.
- 141 students earned 2.1 to 3.8 credits; they are in Group Three.

Students in Groups One and Three were selected for comparison. MAP scores in Communication Arts and Math were available for analysis, beginning with 2008 scores as a baseline, from the year before students began middle school. The graphs on the next page show comparisons of scores for these two groups.

As in District One, both Groups 1 and 3 showed improvement in their average Communication Arts scores from their sixth grade year to their eighth grade year. Group 3 (the students who earned more than two credits) started out in 2009 with an average score that was approximately 22 points higher than Group 1. By 2011, their average score was 22 points higher than their score in 2009. In contrast, students in Group 1 showed an improvement over the same time period of 30 points, a greater degree

[Course Types chart]

9 Of the students in this analysis, all earned at least a half credit in an arts class.
of improvement than students in Group 3. Thus, taking more credits in the fine arts is not associated with more improvement in Communication Arts. This difference between the two groups is statistically significant.

![Communication Arts Score Comparisons](image)

A similar trend was observed for students’ average Math scores. Both groups showed increases over time, and Group 3 (the students who earned more fine arts credits) outscored Group 1. However, the magnitude of change from 2009 to 2011 was higher for the students in Group 1: their average score increased by 39 points, while the average score for Group 3 students increased by 34 points. This difference is not statistically significant.
Analyses were also conducted for racial/ethnic and gender subgroups, but no significant findings resulted.

Discussion and Conclusion

In this district, no relationship was found between the number of fine arts credits earned and improvement in standardized test scores. In comparing these two districts, the following differences are evident:

- District Two is smaller, serves mostly White/Caucasian students, and is located in a more affluent community than District One.
- Unlike District One, District Two middle school students are required to take at least one cycle of a fine arts elective.
- Students in District Two started out (in 6th grade) with higher Math and Communication Arts scores than students in District One, showed somewhat higher improvement over time, and finished with higher scores as well.
- In their 7th grade year, students in District One tended to attain scores that were lower in scale than the average scale scores for the year before, although they rebounded and climbed higher in 8th grade. In District Two, the upward trajectories were constant over time.
- In District One, there was a large difference in Math and Community Arts scores across all three years between students who had not taken fine arts courses and students who
had taken three or more fine arts classes. In District Two, the difference in average scores between the two groups of students was less pronounced.

The finding of a relationship between taking arts classes and standardized test scores for District One and the lack of a relationship in District Two may be due to one or more of these differences, although this study was unable to suggest what the reasons might be. Some possibilities include the following:

- Other studies of the impact of arts education have found that the arts may have more benefits for less advantaged children than for more advantaged children.
- The quality of fine arts instruction may differ at the two districts.
- There may be fewer differences in the way the fine arts are taught, as compared to how other subjects are taught, at District Two as compared to District One.

One hypothesis that explains why students who take more arts courses often do better than their peers (even after controlling for socioeconomic differences) is that the arts help teach creative thinking and involve both the right and left hemispheres of the brain. It is possible that District Two has a different approach to instruction that includes “creative thinking” across academic areas.

Overall, the findings of this Middle School Study are inconclusive: studying the fine arts is significantly related to increased academic achievement in one district but not the other. In order to more fully understand the possible benefits of fine arts education, the following steps may be helpful:

- Repeating these analyses in other school districts. It should be noted that, although this study was originally designed to include four districts, some districts/middle schools elected not to participate. The superintendent of another large district had agreed to participate, but district staff were unable to provide the data needed for the study, a situation that was repeated for a more rural middle school south of St. Louis.
- Continuing to follow the students in this analysis through their high school years as they once again have choices to take more fine arts electives in addition to the arts credit required for high school graduation in the state of Missouri.
- Conducting interviews with personnel and students in both districts included in this study to collect qualitative information on possible reasons for the differences in results.