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ABSTRACT

Evaluations of the "Long-Range Magnet School Plan" court-ordered desegregation program occur in 3 year cycles. This report evaluates the programs of three Science and Mathematics Magnet Middle Schools in operation in Kansas City, Missouri. After presenting a program description and evaluation design, enrollment and achievement trends at the three schools during 4 years of operation are reported. Minority and non-minority students from sixth through eighth grade were examined for patterns of achievement performance on the following standardized tests: Iowa Tests of Basic Skills (ITBS), Missouri Mastery and Achievement Testing (MMAT), and Degrees of Reading Power (DRP). Two intact groups of students, enrolled continuously for 3 years, were tracked from the sixth grade to the eighth grade for patterns of achievement on the ITBS. Examination of achievement data indicated differences in achievement between minority and non-minority students in favor of non-minority students. The researchers reported that this finding supported the conclusion that the magnet program continues to impact non-minority achievement to a greater extent that minority achievement. Findings of the most recent cohort group, with the exception of reading achievement, indicated that this discrepancy may have been reduced substantially. Results from ANCOVA with a sample of district middle school students as a comparison group indicate few significant differences between math/science students and comparison students. The researchers concluded that without substantial improvement in minority achievement, the program has not completely fulfilled its' mission. (MDH)

Achievement and Enrollment Evaluation of the Science and Mathematics Middle Magnet Schools

1990-1991

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October 1991

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ACHIEVEMENT AND ENROLLMENT EVALUATION OF THE SCIENCE/MATHEMATICS MIDDLE MAGNET SCHOOLS

1990-1991

Introduction

As specified in the *Long-Range Magnet School Plan* (Hale & Levine, 1986), evaluations of programs funded by the desegregation court order will occur in three year cycles. The first two years of program implementation will be examined through formative evaluations, designed to provide feedback and guidance to program managers and stakeholders, with an eye toward improving program functioning. The third year of program implementation is examined with a summative evaluation, focusing upon program implementation success and progress toward meeting program objectives and goals. The following three year cycle includes two years (years four and five) of achievement and enrollment summaries and, one year (year six), which is a second summative evaluation. The Science and Mathematics Magnet Middle Schools (hereinafter cited as the middle magnet schools) have completed their fourth year. Following a brief discussion of the science/math magnet program and a description of the evaluation design, this report will present enrollment and achievement trends at the three middle magnet schools.

Program Description

Three schools have been in operation for four years as Science and Mathematics Middle Schools: Bingham, Lincoln, and Southeast. The middle magnet schools were in their first year of implementing the science/math theme during the 1987-1988 school year. During the first year of implementation, Bingham served students in the seventh and eighth grades; Lincoln served students in the sixth and seventh grades; and Southeast served students in the sixth through eighth grades. With the initiation of the second implementation year (1988-1989) Bingham and Lincoln joined Southeast in serving the complete middle school complement of grades six through eight.

According to the Long-Range Plan, the science/math middle school program will provide opportunities for "investigative learning, applied learning, or other activity-oriented learning opportunities." Additionally, "the middle school magnets in science and math will stress learning of science and math throughout the regular curriculum" (Hale & Levine, 1986, p. 84).

With the influence of the magnet theme, each school's planning outline speaks to the goal of infusing science and mathematics throughout the entire curriculum. Each plan identifies relevant instructional activities to facilitate the student's acquisition of scientific and research based skills. The planning outlines for all three schools propose to teach inquiry and problem solving skills, provide opportunities for guided and independent practice of skills learned, and to provide hands-on laboratory experiences. The proposed utilization of computer resources and activities for problem-solving and practice is also similar across the three schools.

Evaluation Design

This report examines the middle magnet schools' achievement and enrollment during four years of operation under the court-ordered desegregation plan. Data for academic years 1987-88 through 1990-91 will be reported. The emphasis of this report will be on the effectiveness of the program in terms of enrollment and desegregative progress as well as achievement outcomes, as measured by the Iowa Tests of Basic Skills (ITBS), Missouri Mastery and Achievement Test (MMAT), Degrees of Reading Power Test (DRP). ITBS achievement data, as well as enrollment data, will be examined for minority and non-minority students.

Achievement performance for middle magnet school students will be examined for two sixth grade cohorts. These cohorts (1988 and 1989) consist of those students who have been enrolled for three years in the math/science program and have ITBS scores for each year enrolled. Additionally, middle magnet school students will be compared statistically to a random sample of students in other district middle schools. These data will identify achievement areas where math/science magnet school student achievement performance differs from their district peers, as well as areas in which no differences in achievement performance are found.

Results

Achievement

Achievement data for the four years of implementation are included in this report. Iowa Tests of Basic Skills (ITBS), Missouri Mastery and Achievement (MMAT), and Degrees of Reading Power (DRP) scores are reported. The MMAT is a state mandated criterion-referenced test. Students in grades 6 and 8 are tested in the Spring. Average scale scores are reported for language arts, math, and science. The DRP tests are criterion-referenced examinations in which reading skills at different proficiency levels are measured.

ITBS mean grade equivalent scores have been converted to percentile ranks for presentation purposes. Scores obtained in 1987 and 1988 have been adjusted to be directly comparable to 1985 norms. Scores in 1989 and 1990 are based on 1985 norms. ITBS scores have been reported for minority and non-minority students by grade level and by year. District and national norms are provided for reference.

Additionally, ITBS scores have been examined by tracking intact groups of students across three years of testing. Two groups (cohorts) of students have been in the middle magnet program for three years: 1988 sixth graders tracked to 1990 as eighth graders, and 1989 sixth graders tracked to 1991 as eighth graders.

Lastly, ITBS achievement scores were compared to the scores of a random sample of other district middle school students using inferential statistics. The statistical procedure identified those achievement areas in which significant differences between groups in ITBS achievement existed, as well as those with no differences between groups.

ITBS achievement. ITBS scores are presented in Tables 1A (reading and language) and 1B (math and science) for minority and non-minority students in grades 6, 7, and 8 by school and content area tested. Baseline scores (1987) for the year prior to program implementation are included for reference.

Reading. Reading achievement, across schools, grades and years, for both minority and non-minority students, was found to be relatively inconsistent (see Table 1A). At the sixth grade level, while some improvement was found during specific years, minority achievement has generally declined from baseline performance when compared to the national norm group. Alternately, non-minority achievement, across grades, and years, has typically improved at Lincoln, and declined at Bingham and Southeast, when referenced to baseline performance.

Bingham's and Lincoln's seventh grade non-minority student performance, after declining in 1988 and 1989, has had improved achievement scores in 1990 and 1991. Other than sporadic gains, in single years, Southeast's non-minority students have had declining reading performance.

At the eighth grade, minority performance has typically been declining, although some gains have been found (e.g., Bingham and Southeast from 1990 to 1991). Non-minority eighth grade performance also has been declining, especially at Southeast, although some gains were found at Lincoln.

When 1991 reading performance was compared to district and national norms, it was found that Bingham's and Southeast's minority sixth, seventh, and eighth graders performed below district

Table 1A
Iowa Test of Basic Skills Reading & Language Percentile Ranks
Spring 1987, 1988, 1989, 1990 and 1991

School	Reading							Language						
						Dist.	Natl.						Dist.	Natl.
Grade	1987	1988[2]	1989	1990	1991	1991	Norm	1987[1]	1988[2]	1989	990	1991	1991	Norm
Ethnic														
Bingham														
Six	—	—	30	34	24	33	50	—	—	39	42	28	39	50
Minority	—	—	30	32	23			—	—	36	37	26		
Non-Minority	—	—	40	38	35			—	—	41	39	45		
Seven	36	44	41	36	38	38	50	45	52	48	42	40	43	50
Minority	35	38	34	34	34			50	47	44	38	36		
Non-Minority	60	55	43	44	52			68	49	42	40	51		
Eight	37	40	46	40	33	39	50	50	47	51	51	38	44	50
Minority	39	34	39	37	30			51	45	48	38	36		
Non-Minority	71	54	56	40	47			74	55	53	48	43		
Lincoln														
Six	—	42	29	42	40	33	50	—	47	37	41	40	39	50
Minority	—	42	29	36	35			—	49	37	41	39		
Non-Minority	—	44	34	50	56			—	49	39	47	43		
Seven	—	44	46	41	41	38	50	—	50	51	49	42	43	50
Minority	—	43	43	36	36				54	52	45	38		
Non-Minority	—	41	46	53	51				52	49	50	49		
Eight	—	—	38	53	40	39	50	—	—	48	55	45	44	50
Minority	—	—	37	50	37			—	—	47	50	46		
Non-Minority	—	—	44	57	48			—	—	50	57	44		
Southeast														
Six	—	32	22	30	26	33	50	—	39	31	37	29	39	50
Minority	—	32	27	29	25			—	41	28	34	24		
Non-Minority	—	48[3]	20[3]	32[3]	44			—	47	24	36	36		
Seven	23	38	39	36	25	38	50	35	49	45	42	29	43	50
Minority	32	39	39	36	26			40	45	40	36	29		
Non-Minority	32[3]	23[3]	64[3]	21[3]	11[3]			4[3]	19[3]	67[3]	47[3]	43[3]		
Eight	29	31	46	40	31	39	50	38	38	46	41	29	44	50
Minority	37	30	47	34	31			44	33	41	35	39		
Non-Minority	—[4]	61[3]	44[3]	25[3]	30			—[4]	42[3]	51[3]	19[3]	36		

Note: The 1987 and 1988 scores were converted to be comparable to 1985 norms. Percentile ranks based on ethnic status may not represent all cases tested as some students did not report an ethnic code.

[1] In the 1986-1987 school year, neither Bingham nor Southeast had sixth grade students.
[2] In the 1987-1988 school year, Bingham had no sixth grade and Lincoln had no eighth grade.
[3] Based on less than 10 students.
[4] Scores based on less than four students are not reported.

Table 1B
Iowa Test of Basic Skills Math & Science Percentile Ranks
Spring 1987, 1988, 1989, 1990 and 1991

School / Grade / Ethnic	Math							Science					
	1987[1]	1988[2]	1989	1990	1991	Dist. 1991	Natl. Norm	1988[2]	1989	1990	1991	Dist. 1991	Natl. Norm
Bingham													
Six	---	---	28	39	21	34	50	---	38	49	38	51	50
Minority	---	---	28	39	19			—	37	46	35		
Non-Minority	---	---	36	47	41			—	59	44	56		
Seven	37	39	34	32	30	34	50	48	40	53	40	52	50
Minority	42	37	32	30	24			40	40	33	45		
Non-Minority	72	44	39	27	49			67	49	57	58		
Eight	36	36	36	37	31	34	50	41	46	46	39	47	50
Minority	38	30	36	34	29			38	43	31	34		
Non-Minority	64	48	38	28	38			57	57	46	56		
Lincoln													
Six	---	50	36	47	39	34	50	49	38	50	49	51	50
Minority	---	47	31	42	34			47	37	45	43		
Non-Minority	---	53	47	53	58			55	49	55	66		
Seven	---	51	46	42	43	34	50	40	49	48	56	52	50
Minority	—	49	44	32	38			42	46	39	51		
Non-Minority	---	56	34	58	53			45	50	61	67		
Eight	---	---	46	52	38	34	50	---	41	52	44	47	50
Minority	---	---	46	48	33			---	37	41	39		
Non-Minority	---	---	50	50	46			---	43	50	55		
Southeast													
Six	---	34	22	28	24	34	50	38	33	38	37	51	50
Minority	---	31	26	28	23			38	33	35	35		
Non-Minority	---	39[3]	28[3]	44[3]	43			41[3]	18[3]	73[3]	71		
Seven	32	42	44	32	24	34	50	40	36	35	32	52	50
Minority	42	44	39	30	24			40	29	31	32		
Non-Minority	70[3]	32[3]	66[3]	54	22[3]			8[3]	32[3]	31[3]	53[3]		
Eight	32	28	37	34	22	34	50	35	41	30	30	47	50
Minority	42	28	36	28	23			32	35	25	30		
Non-Minority	--[4]	57[3]	52[3]	48[3]	34			--[4]	57[3]	42[3]	31		

Note: The 1987 and 1988 scores were converted to be comparable to 1985 norms. Percentile ranks based on ethnic status may not represent all cases tested as some students did not report an ethnic code.

[1] In the 1986-1987 school year, neither Bingham nor Southeast had sixth grade students.
[2] In the 1987-1988 school year, Bingham had no sixth grade and Lincoln had no eighth grade.
[3] Based on less than 10 students.
[4] Scores based on less than four students are not reported.

and national norms. Additionally, Lincoln's minority seventh and eighth graders were below district and national norms.

Bingham's and Lincoln's non-minority 1991 reading achievement was above district norms at each grade level. Southeast's non-minority sixth graders exceeded the district norm. Few non-minority students were above the national norm: Bingham's and Lincoln's sixth grade, and Lincoln's seventh grade exceeded the norm.

Language. With the exception of an isolated gain in a single year or two, language achievement, for both minority and non-minority students, across grades, has been characterized by declines, relative to baseline or first year test scores (see Table 1A). An examination of sixth grade language achievement indicated that both groups had declining performance, with isolated exceptions in 1990 and 1991, in which some schools had modest increases. For example, Bingham's non-minority students had increased language achievement scores from 1990 to 1991 (six percentile points).

When compared to district and national norms in language, Bingham's and Southeast's minority students, at each grade, and Lincoln's seventh graders, were below both norms in 1991. Only Lincoln's sixth and eighth grade minority students were at or above the district norm.

Non-minority 1991 achievement at Bingham and Lincoln, for sixth and seventh graders, was above district norms. Alternately, eighth graders at Bingham and Lincoln were below district norms, as were sixth, seventh, and eighth grade non-minority students at Southeast.

Math. With the exception of sixth grade achievement for non-minority students, math achievement since the baseline year, or the first year tested, has not improved appreciably in the math/science theme (see Table 1B). At the seventh and eighth grades, across schools, both minority and non-minority achievement scores are below baseline scores.

When 1991 scores were compared to district and national norms, minority achievement at Bingham and Southeast, in all grades, was below norm. Additionally, Lincoln's minority eighth graders were below both district and national norms. Alternately, all non-minority students, with the exception of Southeast's seventh graders, were at or above district norms in math. Furthermore, Lincoln's sixth and seventh graders exceeded the national norm and Bingham's seventh graders approached the norm.

Science. When science achievement was examined across the four years of implementation and compared to baseline scores, or first year tested scores, it was found that minority achievement has been relatively consistent across years (see Table 1B). Alternately, non-minority achievement has fluctuated quite frequently during this time. Minority science achievement in 1991, across schools

and grades, was below district and national norms. However, Lincoln's seventh grade minority students scored above the national norm but not the district norm. Non-minority science scores were above district and national norms at each grade level and each school with the exception of Southeast's eighth grade.

Minority and non-minority achievement trends

Two intact groups of students, who had been enrolled continuously for three years, were tracked from the sixth grade to the eighth grade. Sixth graders in 1988 and 1989 were examined across time for patterns of achievement performance on the ITBS.

Reading. Figures 1A and 1B display reading achievement across time for two cohorts. As can be seen in Figure 1A, the 1988 minority sixth grade cohort has had increasing achievement performance during their three years in the magnet program. The 1989 minority sixth grade cohort, while achieving at a level less than that of the 1988 cohort, had improving performance as seventh graders and a slight decline as eighth graders. Both cohorts left the magnet program achieving at a level greater than their entry level achievement but still below the national norm.

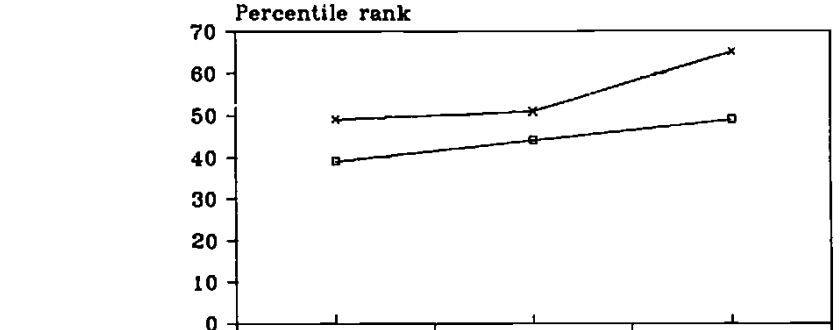
Figures 1A and 1B also display non-minority reading achievement for the two cohorts. Both cohorts have had increasing reading achievement during three years. While the 1989 cohort achieved at a level less than the 1988 cohort, the gain from sixth to eighth grade was greater. Both groups have scored above the national norm in the seventh and eighth grade.

Language. Both minority cohorts left the magnet program scoring higher in language arts than when they entered the program (see Figures 2A and 2B). However, the achievement gain, over three years, was minimal. Again, the 1988 cohort outscored the 1989 cohort and, in the seventh and eighth grades, had scores at or above the national norm.

Non-minority language achievement across time, while exhibiting a small decline in one year, was found to be improved at the end of three years (see Figures 2A and 2B). However, the gain for each non-minority cohort, from sixth to eighth grade, was less than ten percentile points. The 1988 cohort scored above the national norm in each year. The 1989 cohort was at, or slightly below, the national norm.

Math. Minority student math achievement for the two cohorts was found to be only minimally improved over the course of three years (see Figures 3A and 3B). Both groups consistently scored below the national norm. The 1988 cohort had a five percentile point improvement since entering the program. The 1989 cohort had a two percentile point improvement.

Figure 1A
ITBS Reading Achievement Across Time: 1988 Sixth Grade Cohort

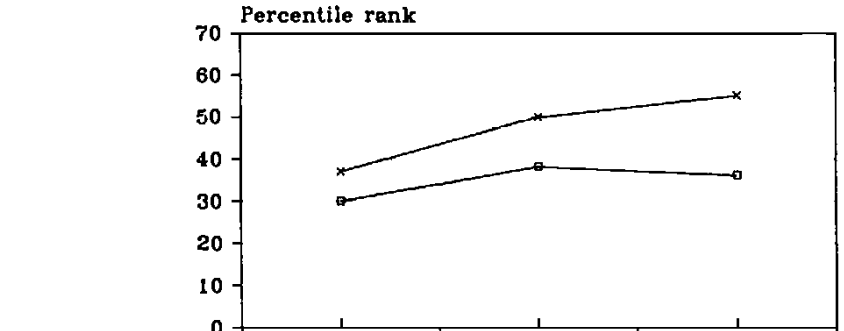


	Sixth	Seventh	Eighth
Minority	39	44	49
Non-Minority	49	51	65

Grade

Note: Percentile ranks were converted from mean grade equivalent scores.

Figure 1B
ITBS Reading Achievement Across Time: 1989 Sixth Grade Cohort



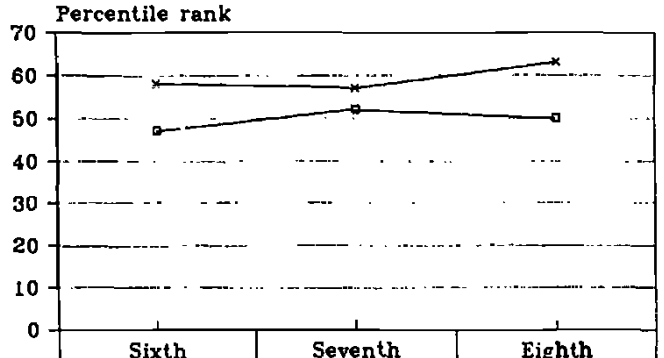
	Sixth	Seventh	Eighth
Minority	30	38	36
Non-Minority	37	50	55

Grade

Note: Percentile ranks were converted from mean grade equivalent scores.

Figure 2A

ITBS Language Achievement
Across Time: 1988 Sixth Grade Cohort



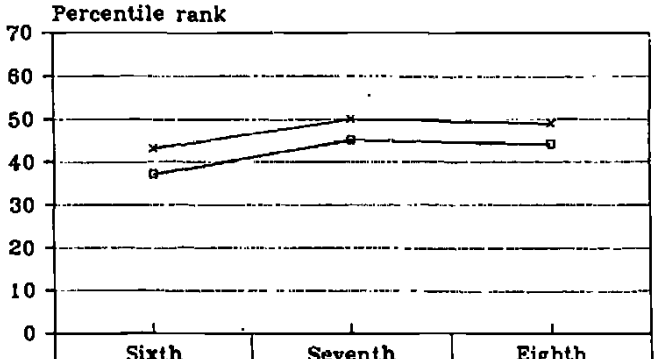
	Sixth	Seventh	Eighth
Minority	47	52	50
Non-Minority	58	57	63

Grade

Note: Percentile Ranks were converted from mean grade equivalent scores.

Figure 2B

ITBS Language Achievement
Across Time: 1989 Sixth Grade Cohort

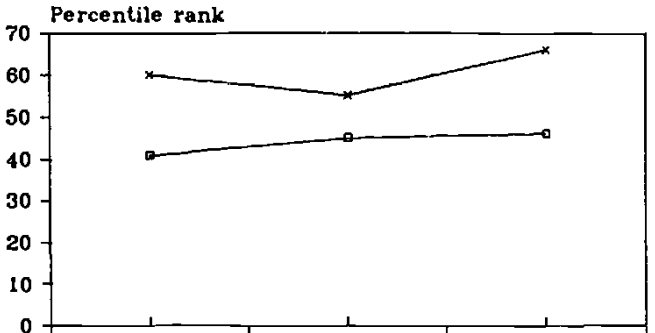


	Sixth	Seventh	Eighth
Minority	37	45	44
Non-Minority	43	50	49

Grade

Note: Percentile ranks were converted from mean grade equivalent scores.

Figure 3A
ITBS Math Achievement
Across Time: 1988 Sixth Grade Cohort

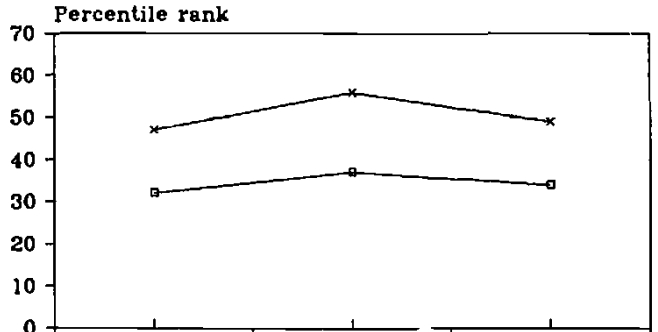


	Sixth	Seventh	Eighth
Minority	41	45	46
Non-Minority	60	55	66

Grade

Note: Percentile ranks were converted from mean grade equivalent scores.

Figure 3B
ITBS Math Achievement
Across Time: 1989 Sixth Grade Cohort



	Sixth	Seventh	Eighth
Minority	32	37	34
Non-Minority	47	56	49

Grade

Note: Percentile ranks were converted from mean grade equivalent scores.

Non-minority cohort achievement trends suggest different patterns of performance (see Figures 3A and 3B). While both cohorts scored near or above the national norm in each of the three years, the achievement gain from sixth to eighth grade, was minimal. The 1988 cohort had a six percentile point improvement. The 1989 cohort had a two percentile point improvement. Interestingly, while the 1988 cohort had declining performance from sixth to seventh grade, the 1989 cohort had increasing performance. Similarly, when the 1989 cohort had decreasing performance from seventh to eighth grade, the 1988 cohort had increasing performance. Both cohorts had similar performance in the seventh grade, but at the end of the eighth grade, the non-minority cohort achievement discrepancy was 17 percentile points.

Science. Minority cohort achievement was found to be quite similar across cohorts and years (see Figures 4A and 4B). While both minority cohorts scored below the national norm in each of three years, only the 1989 cohort left the program with science scores above their sixth grade performance. The 1988 cohort left the program with a three percentile point decline from their sixth grade performance.

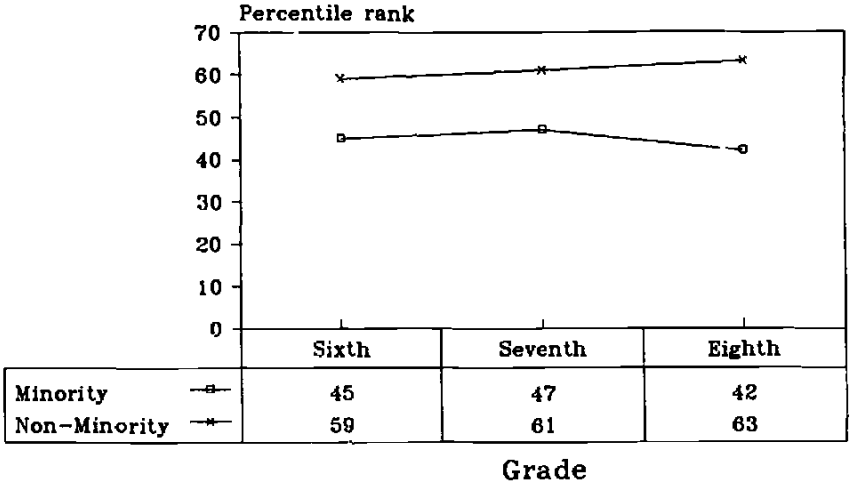
Non-minority cohort achievement was homogeneous across cohorts and grades (see Figures 4A and 4B). While both non-minority cohorts had science achievement scores above the national norm at each grade level, the 1988 cohort entered and left the program with higher scores. Gains made, from sixth to eighth grade, for both cohorts, were moderate.

Math/Science students compared to other district students

In order to see if ITBS achievement differences between math/science middle school students and other district middle school students were statistical different, random selections of the district's middle school students were taken at each grade level to serve as comparison groups. Approximately equal numbers of students were sampled at each grade level.

To compensate for pre-existing achievement differences between the math/science students and comparison group students when they entered the 1990-1991 school year, Cognitive Abilities Test scores (CogAT) were covaried with ITBS scores. The CogAT score was used to adjust the dependent variable (1991 ITBS scores) so that differences in ability were removed from ITBS achievement scores. Analysis of covariance procedures were used. The mean unadjusted and adjusted grade equivalent scores were converted to percentile ranks for presentation in this report. Summary data for these analyses can be found in Table 2. The reader should note the footnote to Table 2 which explains the testing of significant differences.

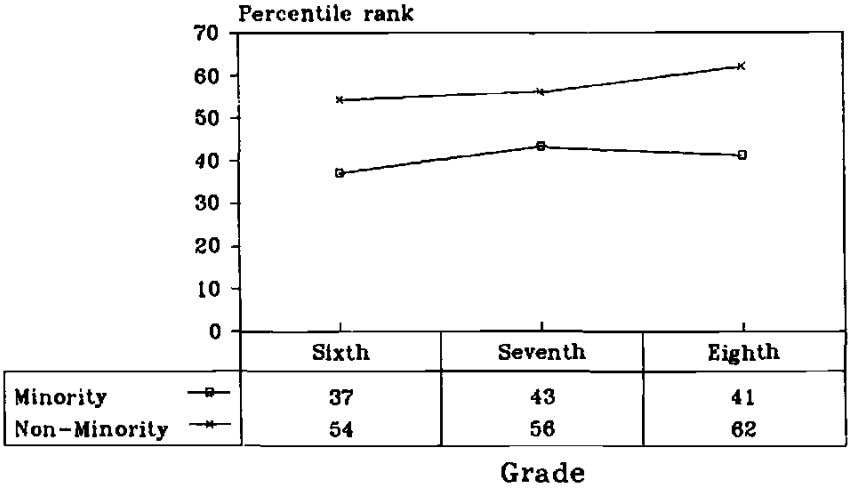
Figure 4A
ITBS Science Achievement Across Time: 1988 Sixth Grade Cohort



	Sixth	Seventh	Eighth
Minority	45	47	42
Non-Minority	59	61	63

Note: Percentile ranks were converted from mean grade equivalent scores.

Figure 4B
ITBS Science Achievement Across Time: 1989 Sixth Grade Cohort



	Sixth	Seventh	Eighth
Minority	37	43	41
Non-Minority	54	56	62

Note: Percentile ranks were converted from mean grade equivalent scores.

Table 2
1991 Summary Data Comparing Math/Science Middle School Students and Randomly Selected District Middle School Students

Test Grade Means	Math/Science Percentiles	Comparison Percentiles	Probability Level
Reading			
Grade 6			
Unadjusted mean	31	29	
Adjusted mean	30	30	.94
Grade 7			
Unadjusted mean	38	32	
Adjusted mean	35	35	.70
Grade 8			
Unadjusted mean	37	36	
Adjusted mean	35	38*	.03
Language			
Grade 6			
Unadjusted mean	38	37	
Adjusted mean	37	37	.58
Grade 7			
Unadjusted mean	43	38	
Adjusted mean	40	40	.95
Grade 8			
Unadjusted mean	44	42	
Adjusted mean	42	44	.08
Math			
Grade 6			
Unadjusted mean	31	33	
Adjusted mean	29	34*	.00
Grade 7			
Unadjusted mean	36	26	
Adjusted mean	32*	30	.01
Grade 8			
Unadjusted mean	34	28	
Adjusted mean	31	31	.55

Table 2 (continued)
1991 Summary Data Comparing Math/Science Middle School Students and Randomly Selected District Middle School Students

Test Grade Means	Math/Science Percentiles	Comparison Percentiles	Probability Level
Science			
Grade 6			
Unadjusted mean	46	54	
Adjusted mean	45	56*	.00
Grade 7			
Unadjusted mean	52	47	
Adjusted mean	49	51	.28
Grade 8			
Unadjusted mean	44	50	
Adjusted mean	46	47	.49

Note: * = The difference between math/science and comparison groups was significant at $p \leq .05$. Analysis was done using grade equivalent scores. For presentation, these scores were converted to percentiles. The adjusted mean represents a statistical estimate of the students' performance on the 1991 posttest, assuming that the students had identical 1990 pretest means. This adjusted mean is computed during the analysis of covariance procedure and is to be used for comparison purposes. Analyses were conducted using Cognitive Abilities Test scores as the covariate.

In many instances, math/science middle school students had larger unadjusted means when compared to the comparison students. However, when adjusted means were computed many of these differences disappeared. Significant differences between groups were found for few ITBS subtests. For ITBS reading, no significant differences were found between groups at the sixth and seventh grade. At the eighth grade, comparison students had a significantly higher mean.

When ITBS language achievement means were examined, no significant differences were found, at the sixth, seventh, or eighth grade, between math/science students and comparison students. Significant differences were found however, when math achievement means were examined. Comparison students had significantly higher math means at the sixth grade. Conversely, seventh grade math/science students had higher means. No significant differences were found at the eighth grade for math achievement.

ITBS science achievement means were found to be significantly different at the sixth grade, with the comparison students outperforming the math/science students. No other significant differences were found between groups for science achievement.

MMAT achievement. Table 3 displays the results of Missouri Mastery and Achievement Testing (MMAT) for sixth and eighth grade students at the three middle magnet schools and for the district and state. Data for the last four years are presented. The reader will note that district and state averages have declined since 1990.

Reading/English/language arts. As can be seen in Table 3, MMAT achievement scores across years, for sixth grade reading/English/language arts, achievement has declined with each test administration at the three middle schools, and for the district and state. Furthermore, in 1991 Bingham's and Southeast's sixth graders scored below district and state averages. Lincoln's sixth graders were at the district average but below the state average.

Eighth grade reading/English/language arts achievement, after an initial gain at Bingham and Southeast in 1989, has declined with each test administration. Only Bingham's eighth graders were above the district average in 1991.

Math. Math MMAT achievement at the sixth grade demonstrated a consistent pattern across the math/science middle schools and the district as a whole. After a decline in 1989 from 1988 scores, 1990 scores were higher. In 1991, scores declined again to levels similar to 1989. Bingham and Southeast sixth graders scored below district and state averages in 1991. Alternately, Lincoln sixth graders were above the district average but below the state average in MMAT math.

Eighth grade math scores reflect a pattern of performance similar to sixth grade math achievement. After an initial increase in scores in 1989 (and 1990 at Lincoln) scores have declined in 1990 and 1991 to a level similar to that found in 1988. Bingham and Lincoln eighth graders scored above the district average in math but below the state average. Southeast students scored below the district average.

Science. Sixth grade science achievement, after an increased performance in 1990 from 1989, have declined to levels similar to that of 1989 in 1991. This pattern was consistent across the three middle schools and for the district. Bingham and Southeast sixth graders were below district and state averages in 1991. Lincoln sixth graders scored above the district average in science but below the state average.

Table 3
Missouri Mastery & Achievement Tests Average Scale Scores
Spring 1988, 1989, 1990, and 1991

Grade	Reading/English Language Arts				Math				Science			
School	1988	1989	1990	1991	1988	1989	1990	1991	1988	1989	1990	1991
Six												
Bingham	—	267	261	218	---	276	293	254	---	264	297	261
Lincoln	277	265	253	225	303	281	294	283	274	274	292	272
Southeast	258	236	234	203	259	244	257	248	262	244	28	249
District	258	255	244	225	274	264	274	267	262	260	284	268
State	308	321	310	296	332	339	355	347	332	344	375	352
Eight												
Bingham	299	306	290	286	272	282	280	271	268	290	290	282
Lincoln	---	372	292	267	---	291	309	275	---	265	304	266
Southeast	270	279	268	255	250	264	260	256	253	279	283	247
District	281	278	282	272	265	269	280	270	264	277	295	271
State	322	326	322	318	336	335	346	331	337	345	357	339

Eighth grade science scores, while generally increasing from 1988, have declined in 1991 from 1990. Bingham's eighth graders scored above the district average but below the state average. Lincoln's and Southeast's eighth graders scored below district and state averages.

DRP reading achievement. DRP scores, since 1988, have declined or remained unchanged at Bingham for sixth, seventh, and eighth graders (see Table 4). Lincoln's students have had some improvement in DRP achievement. However, when baseline scores (1988) are compared to 1991 scores, scores are lower in 1991. The same can be said of Bingham and Southeast students across grade levels. Southeast students, with the exception of 1988 to 1989 gains for eighth graders, have had declining or unchanged performance across years and grades. Southeast's DRP performance, across grades and years, parallels that of the district as a whole, in terms of achievement gains and losses.

When the three middle schools were compared to district performance in 1991, it was found that Bingham sixth, seventh, and eighth graders had scored above the district average on the DRP. The same can be said for Lincoln's sixth and eighth graders. Southeast students, at each grade level, scored below the district average on the DRP.

Table 4
Mean Degrees of Reading Power Units
for Science/Math Middle School
and District Students
Spring 1988-91

School Grade	1988	1989	1990	1991
Bingham				
6	NA[1]	57	54	52
7	61	60	58	58
8	67	67	63	62
Lincoln				
6	56	54	52	53
7	61	62	59	56
8	NA[2]	62	64	61
Southeast				
6	54	50	50	46
7	58	56	56	55
8	60	64	60	56
District				
6	53	52	52	51
7	57	58	58	57
8	60	62	61	60

[1] No 6th grade at Bingham.
[2] No 8th grade at Lincoln.

Enrollment

The Federal court has specified minority/non-minority enrollment goals as an indicator of successful desegregation and program implementation. Enrollment figures cited in this report were drawn from the student membership reports prepared annually by the district's Research Office. Figures are based on enrollment data reported on the fourth Wednesday in September. Additionally, grade level program capacity information was obtained from the district's Admissions Office.

According to the *September 26, 1990, Student Membership* (Research Office, 1990) report, each middle school was slightly below program capacity (see Table 5). Furthermore, most grade levels, at each school, were under-enrolled. Only at Southeast, in grades six and seven, did actual enrollment exceed program capacity. Alternately, Bingham's and Southeast's grade eight were under-enrolled by 20%.

Table 5
Middle School Math/Science Program
Program Capacity & Enrollment
1990-1991

School Grade	Program Capacity[1]	Actual[2]	Difference	% of Capacity
Bingham				
Six	230	212	-18	92%
Seven	230	208	-22	90%
Eight	230	184	-46	80%
Total	690	604	-86	88%
Lincoln				
Six	250	222	-28	89%
Seven	214	204	-10	95%
Eight	214	202	-12	94%
Total	678	628	-50	93%
Southeast				
Sixth	250	257	+17	103%
Seventh	240	252	+12	105%
Eight	240	191	-49	80%
Total	730	700	-30	96%

[1] Program capacity utilized by the Admissions Office when placing students in magnet programs.

[2] From *September 26, 1990 Student Membership* (Research Office, 1990).

The achievement of court-ordered desegregation in the Kansas City, Missouri, School District is a central feature of the magnet school plan. According to the *Long-Range Magnet School Plan,* "The purpose of magnet schools for KCMSD is to increase desegregation and potential desegregation in as many of its classrooms as possible" (Hale & Levine, 1986, p. 3). During each year of implementation, each grade level in a school is expected to move closer to the 60%/40% minority and non-minority ratio by a minimum of two percent annually. In the case of the middle magnet schools, this is expressed as a reduction in minority enrollment and an increase in non-minority enrollment. Furthermore, if or when new grade levels are added to an existing school the new grade's racial composition is expected to immediately reflect the 60% minority/40% non-minority ratio.

Table 6 displays enrollment figures by grade level across the four years of program implementation. Initially, it was found that the new grades at Bingham and Lincoln, in year two, did not begin operation at the prescribed 60% minority/40% non-minority ratio.

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Table 6 displays enrollment figures by grade level across the four years of program implementation. Initially, it was found that the new grades at Bingham and Lincoln, in year two, did not begin operation at the prescribed 60% minority/40% non-minority ratio.

Table 6
Minority & Non-Minority Enrollment for Science/Math Middle Magnet Schools by Grade
September 1987, 1988, 1989, and 1990

School / Grade	Year 1 - September 1987				Year 2 - September 1988				Year 3 - September 1989				Year 4 - September 1990			
	Min.		Non-Min.		Min.		Non-Min.		Min.		Non-Min.		Min.		Non-Min.	
	N	% of Total	N	% of Total	N	% of Total	N	% of Total	N	% of Total	N	% of Total	N	% of Total	N	% of Total
Bingham																
Six	----	----	---	----	152	73%	56	27%	153	72%	60	28%	185	87%	27	13%
Seven	163	73%	59	27%	134	75%	45	25%	150	71%	61	29%	159	76%	49	24%
Eight	217	79%	57	21%	155	77%	47	23%	169	76%	53	24%	145	79%	39	21%
Total	380	77%	116	23%	441	75%	148	25%	472	73%	174	27%	489	81%	115	19%
Lincoln																
Six	140	62%	85	38%	99	60%	66	40%	134	60%	88	40%	168	76%	54	24%
Seven	134	66%	68	34%	177	69%	80	31%	140	62%	85	38%	129	63%	75	37%
Eight	---	---	---	----	113	65%	60	35%	142	62%	88	38%	132	65%	70	35%
Total	274	64%	153	36%	389	65%	206	35%	416	61%	261	39%	429	68%	199	32%
Southeast																
Six	69	90%	8	10%	232	97%	7	3%	204	95%	11	5%	243	95%	14	5%
Seven	205	100%	1	0%	220	96%	9	4%	195	97%	7	3%	242	96%	10	4%
Eight	303	99%	2	1%	193	98%	4	2%	196	97%	6	3%	186	97%	5	3%
Total	577	98%	11	2%	645	97%	20	3%	595	96%	24	4%	671	96%	29	4%

Note: 1987 enrollment figures are computed by subtracting students in self-contained special educational programs, reported in the *Junior High/Middle School Membership* Report (Research Office, September 1987) from total enrollment figures, reported in *A By-School Comparison of Student Enrollment by Race & Grade for the Years 1986-87 & 1987-88* (Research Office, 1987); 1988 enrollment figures are from *September 28, 1988, Student Membership* (Research Office, 1988); 1989 enrollment figures are from *September 27, 1989, Student Membership* (Research Office, 1989);1990 enrollment figures are from *September 26, 1990, Student Membership* (Research office, 1990).

The figures in Table 6 indicated that Bingham had moved toward the enrollment goal with an annual 2% increase in non-minority enrollment during years two and three. Lincoln, while not having made progress toward the enrollment goal in year two, did approximate the enrollment goal in year three. Southeast has had an annual 1% increase in non-minority enrollment during years two and three. While modest gains were made in years two and three, substantial declines in non-minority enrollment were found at Bingham and Lincoln in year four. Both Bingham's and Lincoln's sixth grade enrollment depart from the prior year enrollment trend at grade six. Grades seven and eight, while not as discrepant as sixth grade enrollment, also depart from prior year enrollment trends. Southeast's enrollment trend, at each grade level, has remained relatively stable with no more than 5% non-minority enrollment during years two, three, and four.

Program-wide enrollment figures, during the four years of implementation, indicated that sixth grade non-minority enrollment has been declining, with the exception of Year three enrollment (see Figure 5). Seventh grade non-minority enrollment has remained mostly unchanged during the four years of implementation. Eighth grade non-minority enrollment, after an initial increase in year two, has remained relatively similar across years three and four.

Summary

The three middle magnet schools with a science/math theme have completed their fourth year of operation. According to September enrollment figures and program capacity information, each middle school is slightly under-enrolled. At Southeast, enrollment exceeded capacity in grades six and seven. Bingham and Southeast's grade eight were under-enrolled by 20%.

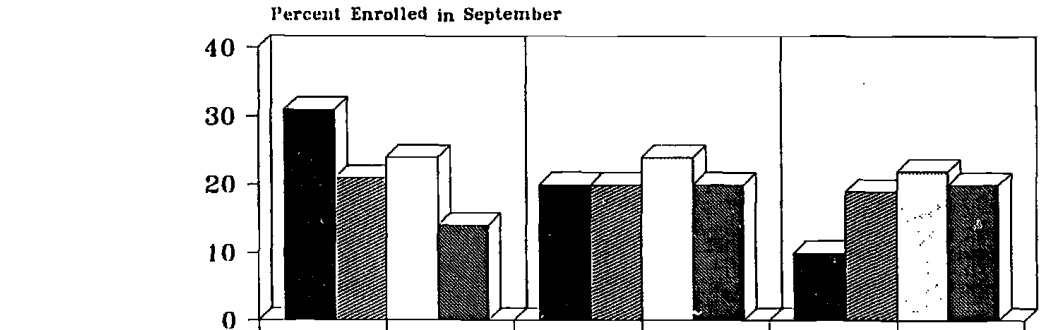
Desegregative progress, toward court-ordered racial composition goals, has been addressed in the first three years of program implementation. However, in the fourth year, Bingham and Lincoln non-minority enrollment, at each grade level, has dropped by as much as 16% from the previous year. Southeast's non-minority enrollment, which has been minimal, remained relatively unchanged from the previous year. Only Lincoln's seventh and eighth grade enrollment approaches the desegregation goals, as established by the Federal court.

Program-wide non-minority enrollment at the sixth grade level has been typically declining since 1987, with the exception of 1989 enrollment. Alternately, eighth grade non-minority enrollment has been increasing since 1987, with the exception of 1991 enrollment.

As such, the enrollment data presented in this report suggest that desegregation has been hindered in the 1990-1991 school year and is reflected in the reduced numbers of non-minority

Figure 5

Program-wide Non-minority Enrollment by Grade and by Year



	Sixth	Seventh	Eighth
Year One	31	20	10
Year Two	21	20	19
Year Three	24	24	22
Year Four	14	20	20

Grade

Note: Figures represent the percent of non-minority students enrolled across the three middle schools.

students enrolled in the three middle schools. Particularly disconcerting, in light of the relative appeal of math/science elementary schools in the district, are the eighth grade enrollments at Bingham and Southeast where 20% of the potential placement slots remained unfilled in September. Furthermore, program-wide enrollment trends suggest that declining sixth grade non-minority enrollment across four years of implementation may continue to hinder the successful desegregation of the three math/science middle schools.

Achievement data examined in this report has detected differential achievement performance between minority and non-minority students. With the exception of Lincoln's minority students (sixth grade reading and math, seventh grade math and science, and eighth grade language), other math/science middle school students achieved below district and national norms in ITBS reading, language, math, and science. Conversely, the math/science middle school non-minority students, with the exception of Southeast's students (grades seven and eight reading, grades six and eight language, grade seven math, and grade eight science) scored above district norms and, in some cases, above national norms, in reading, language, math, and science.

Cohort tracking data found that non-minority students, across three years of participation in the math/science program, have consistently scored above the district and national norm in each of the four content areas, particularly for the 1988 sixth grade cohort. Alternately, minority students, during their three years of participation, have reached the national norm in reading (1990) and language (1989 and 1990).

When the achievement discrepancy between minority and non-minority growth (sixth to eighth grade changes in percentile ranks) is considered, the 1988 non-minority cohort made greater gains in the four content areas tested. Conversely, the 1989 achievement discrepancy between minority and non-minority students was found to be substantial only in reading. In language and science, minority students had a larger growth from sixth to eighth grade. In math, both groups made a two percentile point gain from sixth to eighth grade.

Minority and non-minority achievement performance data examined in this report suggest that non-minority students have typically had higher achievement scores across years and content areas. This finding alone would support the conclusion that the magnet program continues to impact non-minority achievement to a greater extent. However, the findings of the most recent cohort group (1989 sixth graders) suggest that, with the exception of reading achievement, the achievement growth discrepancy may have been reduced substantially. Each group made similar progress from sixth to eighth grade. It is important to note that the degree of achievement growth has not been

particularly large for either minority or non-minority students in the 1988 or 1989 cohort groups. The largest increases, from sixth to eighth grade, have been found in reading and language.

Results from analysis of covariance with a sample of district middle school students as a comparison group indicate few significant differences between math/science students and comparison students. Significant differences in favor of the comparison group were found for reading (grade eight), math (grade six), and science (grade six). Math/science middle school students had significantly higher means in math (grade seven). No other significant differences were found between groups.

Clearly, the achievement results suggest a lack of convincing evidence of a math/science magnet program effect. While non-minority students are performing above district and national norms in many ITBS test areas, non-minority students remain below district and national norms in most content areas. Furthermore, analyses comparing math/science students with other district students do not provide compelling evidence that the program has influenced the achievement performance of students in the two theme domains, math and science. Certainly, the cohort tracking data speaks positively to achievement for long-term non-minority enrollees but without substantial improvement in minority achievement the program has not completely fulfilled it's mission of improved achievement for all students and the provision of a desegregated learning environment.

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