DOCUMENT RESUME

ED 376 614 EA 026 339

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TITLE Forecasting Enrollments during Court-Ordered Desegregation.
INSTITUTION Rand Corp., Santa Monica, Calif.
REPORT NO RAND/P-7872
PUB DATE 94
NOTE 28p.
AVAILABLE FROM Distribution Services, RAND, 1700 Main Street, P.O. Box 2138, Santa Monica, CA 90407-2138.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Elementary Secondary Education; *Enrollment Projections; *Enrollment Rate; Enrollment Trends; *Magnet Schools; Minority Groups; *Prediction; *School Desegregation; *School Holding Power; Voluntary Desegregation
IDENTIFIERS *Kansas City School District MO

ABSTRACT

This paper considers the distinctive issues demographers face when they must forecast enrollments in a context of court-ordered desegregation. Specifically, it examines whether magnet schools strengthen a district's overall attractiveness to enrollees from outside, or whether they only siphon students away from other nonmagnet schools within the district, achieving no net effect districtwide. This issue can be clarified by examining patterns of change in grade progression rates as magnet schools are phased in. Methodology involved the analysis of student enrollment and retention for the years 1986-90 in the Kansas City, Missouri School District (KCMSD), a large urban district being transformed by the implementation of a comprehensive magnet school plan. Findings indicate that the magnet schools had enhanced the district's overall retention at most grades but did not produce actual increases at most grades, having merely slowed the overall weakening of districtwide retention. The data provide a "reality check" on the necessary judgment for crafting appropriate forecasting assumptions. Six tables and two figures are included. (LMI)

FORECASTING ENROLLMENTS DURING COURT-ORDERED DESEGREGATION

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P-7872

Published 1994 by RAND
1700 Main Street, P.O. Box 2138, Santa Monica, CA 90407-2138
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FORECASTING ENROLLMENTS DURING COURT-ORDERED DESEGREGATION[1]

by

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ABSTRACT

Distinctive issues arise when a demographer must forecast enrollments in a context of court-ordered desegregation. The key issue studied here is whether magnet schools strengthen a district's overall attractiveness to enrollees from outside, or whether they only siphon students away from other nonmagnet schools within the district, achieving no net effect districtwide. One can clarify this issue by examining patterns of change in grade progression rates as magnet schools are phased in. In this case study, the magnet schools had enhanced the district's overall retention at most grades but did not produce actual increases at most grades. As often as not, they had merely slowed the overall weakening of retention districtwide.

These insights furnished an important "reality check" on the necessary judgment for crafting appropriate forecasting assumptions. The resulting forecast tracked subsequent enrollments reasonably well and avoided exaggerated optimism. The pattern of error three years into the forecast period offers insight into the strengths and weaknesses of the approach.

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[1]Revision of paper presented in the session on "New Directions in School Demography" at the 1994 Population Association of America meetings, Miami. The author thanks the following colleagues for helpful comments on earlier drafts: Allan Abrahamse, Shelley Lapkoff, Jeanne Gobalet, John Hedderson, and John Wardwell.

I. INTRODUCTION

This paper considers the distinctive issues demographers face when they must forecast enrollments in a context of court-ordered desegregation. It draws on an analysis of student enrollment and retention in the Kansas City Missouri School District (KCMSD),[2] a large urban school district being transformed by the implementation of a comprehensive magnet school plan. The analysis attempted to clarify how the plan had changed the dynamics of enrollment from 1986 through 1990. The results would serve as a basis for formulating realistic assumptions for use in forecasting enrollment change from 1991 onward.

Making appropriate assumptions meant gauging how the new magnet schools were affecting retention. The key issue was whether they were in fact strengthening KCMSD's attractiveness, particularly to students from outside the district. To clarify this issue, I analyzed the patterns of change in grade progression rates over the initial phase-in period for magnet schools, 1986-90. This supporting analysis suggested that magnet schools had enhanced the KCMSD's overall retention at most grades, but without producing actual increases at most grades. As often as not, they had merely slowed the overall weakening of retention districtwide.

These insights furnished an important "reality check" on the process of crafting appropriate forecasting assumptions, which cannot avoid making certain judgment calls. Basing a forecast on grade progression rates during the magnet phase-in period (a more conservative posture than that of other analysts) tracked subsequent enrollments reasonably well and avoided exaggerated optimism. The pattern of error three years into the forecast period offers insight into the strengths and weaknesses of the approach.

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[2]This analysis was carried out at the request of defendants in JENKINS, et al. v. STATE OF MISSOURI, et al.

II. BACKGROUND

KCMSD is a large urban school district serving approximately 35,000 students, three-fourths of whom are minority (mostly African American). Kansas City, MO, by contrast, is populated mostly by nonminority persons: in 1990, 67 percent of its residents were white (virtually all nonHispanic).

In the mid-1960s, nearly 75,000 students attended KCMSD; three-fifths were white. After 1967, enrollments declined steadily as whites withdrew. The decline persisted over the next two decades, and KCMSD enrollments fell by half. By 1989, enrollments had slid to only 34,850 students, three-fourths of whom were minority.

A 1984 court desegregation order set in motion a program designed to make KCMSD so attractive that students of all races would be enticed to attend city schools. In 1986, a long range magnet plan (LRMP) was implemented as part of KCMSD's court-ordered desegregation.[3] The LRMP pushed the concept of educational choice to its limits: Between September 1987 and September 1991, 58 new magnet programs were opened in 51 district schools. By 1991, four-fifths of all students attended magnet schools. The LRMP has turned every high school, every middle school, and two of every three elementary schools into magnet schools. Over a billion dollars

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[3]On June 14, 1985, the United States District Court for the Western District of Missouri issued its first remedy decree after nearly a decade of litigation in the Kansas City school desegregation case. The goal of the court's remedy order was expressed as "the elimination of all vestiges of state imposed segregation [and the restoration of] the victims of discriminatory conduct to the position they would have occupied in its absence of such conduct." In furtherance of this goal, the court provided for the design of implementation of magnet schools to assist the state and the KCMSD in expanding desegregative educational experiences for its students. One year later, the district court approved approximately $13 million in desegregation funding during the 1986-87 school year for three magnet programs proposed to be implemented by the district at six schools. The court also ordered the district to submit a comprehensive magnet school program proposal by August 1986.

The district's long range magnet plan (LRMP) was developed during the spring and summer of 1986. During a 49-month time span, all ten district high schools, all eleven middle schools, and two-thirds (35 of 52) of the elementary schools were turned into magnet schools. Source: Missouri Department of Elementary and Secondary Education, "Kansas City, Missouri School District Desegregation Case: Historical Overview," mimeo, n.d.

upgrade facilities--undoubtedly the most ambitious and expensive desegregation program ever undertaken.

The remedy has proven highly controversial because of its cost and its failure to achieve the fundamental objective of increasing nonminority students to 40 percent of enrollment in all of the KCMSD's magnet schools.[4] Under the court-ordered plan, local property owners have seen their taxes nearly double, yet KCMSD has lured only a tiny influx of white students and made no progress toward the 60/40 goal (see Table 1). The annual number of students transferring into the district ("Magnet transfers into KCMSD") rose from 138 in 1987 to only 1,390 by 1993, which is far short of the contemplated eventual target of 6,000. Minorities remain 75.3 percent of all students (compared with 73.5 percent in 1986-87).

In the early 1990s, plaintiffs pressed for continuation of the LRMP, citing what they claimed was "the District's now-proven ability to attract new students--both minority and nonminority--into its schools." Not surprisingly, predictions of the price tag for continuation depended partly on forecasts of future enrollments. As parties with separate agendas peered ahead they discerned markedly different futures (and requisite funding needs). Plaintiffs foresaw hefty increases in enrollments, necessitating further capital expenditures and staff expansion. An impartial appraisal of past data, though, tends to show such projections to be overly hypothetical. I was retained to prepare a defensible forecast, based on a realistic assessment of where enrollment trends were heading.

That mandate called not only for accurate data but also for a carefully justified interpretation of what they foreshadowed. In particular, a key issue had to be resolved: What effect might continued funding have on future retention and attraction, and how could one make the record of the past speak to that issue? The results of the LRMP to date had been disappointing, suggesting that it could do little more to recruit nonminority students into KCMSD. On the other hand, it is possible that

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[4]See coverage by The Wall Street Journal: Rochelle Sharpe, "Controversial Missouri Schools Project Is Bringing Modest Gains, Study Finds," April 26, 1994, p. A8; and Dennis Farney, "Crash Course: Can Big Money Fix Urban School Systems?" January 7, 1992, p. A1.

any meaningful effects of a magnet program might take time to materialize, and that the first few years' experience might be misleading for forecasting later years.

Table 1

Profile of Students and Schools in Kansas City Missouri School District: 1985-1993

Characteristic	1985	1986	1987	1988	1989	1990	1991	1992	1993
Student Enrollment									
Total K-12	35,907	35,858	34,926	32,960	32,659	32,782	33,235	33,495	34,106
% change from prior yr.	*+0.8%*	*-0.1%*	*-2.6%*	*-5.6%*	*-0.9%*	*+0.4%*	*+1.4%*	*+0.8%*	*+1.8%*
Magnet transfers into KCMSD	--	--	138	531	438	792	1,094	1,290	1,390
Resident K-12 (w/o transfers)	35,907	35,858	34,788	32,429	32,221	31,990	32,141	32,205	32,716
% change from prior yr.	*+0.8%*	*-0.1%*	*-3.0%*	*-6.8%*	*-0.6%*	*-0.7%*	*+0.5%*	*+0.2%*	*+1.6%*
Minority share of total[a]	*73.6%*	*73.5%*	*74.1%*	*74.0%*	*75.0%*	*74.8%*	*74.2%*	*74.9%*	*75.3%*
In magnet schools[b]	0	0	8,176	13,580	17,887	27,430	28,346	28,209	27,064
% of all enrolled[b]	*0%*	*0%*	*23%*	*39%*	*52%*	*79%*	*80%*	*80%*	*79%*
Schools									
Total no.	67	66	68						75
Traditional	67	66	48						18
Magnet, by starting yr.									
All years	0	0	20	31	43	59			57
1987			20	--	--	--			
1988			--	11	--	--			
1989			--	--	12	--			
1990			--	--	--	16			

NOTE: Year denotes fall of school year **19XX**. Enrollment is regular K-12 (excluding special education and "other schools").

[a] "Minority" defined as nonwhite (mostly black).

[b] Refers to grand total enrolled, which includes special education and "other schools" not counted within "Total K-12"

SOURCE: Kansas City, Mo. School District Official Fall Student Census Count (annual).

III. CLARIFYING THE EFFECTS OF MAGNET SCHOOLS

The magnet school program is premised on the belief that thousands of students enrolled in neighboring non-KCMSD schools (i.e., private and parochial schools in Kansas City and adjacent suburban schools) can be enticed to pursue their education in the KCMSD public schools. In theory, this means the public schools not only attract in students from outside but retain them over time. In fact, the LRMP may only siphon students away from nonmagnet schools within the district; or students whotransfer into the district may leave after a year. In either case, the LRMP would achieve little or no net effect districtwide.

The forecaster must weigh these possibilities in light of whatever empirical evidence exists on two points:

(1) To what extent has the overall districtwide retention changed in response to the phase-in of KCMSD magnet schools?

(2) To what extent do the magnetized schools themselves strengthen districtwide retention?

My supporting analysis sought to answer these questions, since the answers have a critical bearing on the validity of one's forecasting assumptions. That is, a forecast should posit some systematic rise in future districtwide grade-progression rates[5] if magnet schools attract new students to the district and entice them to pursue their education within its schools. On the other hand, if magnets merely redistribute enrollments within the district, misgauging their effects could lead one seriously astray.

APPROACH

Patterns of change in recent grade progression should be a telling indicator of magnet schools' effectiveness in drawing more new students into the district. That is, whether magnet schools attract new enrollments or simply strengthen retention of existing enrollments should be

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[5]Grade progression rates (like those shown in Table 2) reflect the net flows of students from one grade to the next. In forecasting future enrollments, they are the key parameters in grade progression models of anticipated future enrollments.

statistically apparent over the LRMP's first several years. The districtwide grade progression rates in Table 2 document aggregate flows of students into KCMSD and through its grade structure. The period they cover precedes the 1990 time point at which I had to forecast enrollments from fall 1991 onward. According to these data, the magnet school program had no discernible effect through 1990: A simple "sign test" comparing the initial and final rate in each row is roughly divided between "pluses" and "minuses" (with the former outnumbered by the latter).

Table 2

Grade Progression Rates

Progression rate from	("initial") 1986-87	1987-88	1988-89	("final") 1989-90	Four-year average	Sign test
K>G1	106	103	105	101	103.8	-
G1>G2	91	90	94	90	91.3	+
G2>G3	100	95	97	96	97.0	-
G3>G4	88	90	93	91	90.5	+
G4>G5	94	97	99	97	96.8	+
G5>G6	98	102	108	103	102.8	+
G6>G7	116	113	102	91	105.5	-
G7>G8	88	88	86	86	87.0	-
G8>G9	125	126	109	115	118.8	-
G9>G10	79	70	70	79	74.5	n.c.
G10>G11	86	80	88	82	84.0	-
G11>G12	83	76	75	78	78.0	-
Total no. enrolled	35,857	34,926	34,769	34,320		

Note: Progression rates are measured as of the fall in the two successive years in each column.

Sign test defined as "+" or "-" by subtracting 1986-87 value from 1989-90 value; n.c. denotes no change.

Source: Calculated from KCMSD annual reports.

The rates in Table 2 do reveal the usual entry points where outsiders flow into KCMSD and the grade levels at which retention has deteriorated. Initial decisions to enroll in KCMSD are reflected at two distinct entry points: grade 1 and grade 9. The first row in Table 2 shows that first-grade (G1) enrollments during the past four years have averaged 103.8 percent of the preceding year's kindergarten (K) enrollment. The excess of first-graders over kindergartners in the preceding year means that KCMSD typically draws new enrollments at G1. Likewise, G9 enrollments have

averaged 118.8 percent of G8 enrollments, revealing an influx of new enrollment at the entry point into high school. Thus, the grades 1 and 9 stand out as routine entry points into KCMSD. (Grades 6 and 7 also exhibit this pattern, but not as consistently.) The LRMP is supposed to broaden these gateways and increase retention of all students over time. To reinforce this concept, the LRMP included a "magnet transfer" program designed to facilitate the enrollment of nonminority students from surrounding suburban districts.

The data in Table 2 also reveal deteriorating retention at certain levels. The G6-G7 rates in Table 2 have trended downward in recent years, which means that KCMSD's share of G7 enrollment is generally declining.

Most grade levels, though, display only erratic year-to-year fluctuation without apparent direction, either across rows or in cohort perspective. The product of rates calculated diagonally from upper left to lower right reveals no clear improvements in the survival of successive real cohorts. The product of rates calculated downward in each column reveals a deterioration in the period survival of later synthetic cohorts relative to earlier ones. Overall, evidence of enhanced districtwide retention is conspicuously absent during the first five years the LRMP operated.

It is puzzling that expenditures so massive leave no trace of an effect on retention. Admittedly, the magnet programs were phased in (and, in some instances, enlarged) over a four-year period, and their full attractive effects may have yet to materialize. Still, some trace of an effect should be visible in the retention patterns of the magnet schools themselves. In an effort to unravel this paradox, I calculated grade-progression rates separately for each "generation" of magnet school. The initial generation consists of the 20 magnet schools in place since fall 1987 (see Table 1). Subsequent generations started up in each succeeding year: 11 more in fall 1988, 12 more in 1989, and 16 more in 1990. Most schools established as magnets before 1990 had formerly been traditional schools, with a "pre-magnet" retention record. Some newly opened magnet schools, however, had no such pre-magnet history. Periods of observation, then, vary from school to school depending on when the school was magnetized and whether or not it had a "traditional" past.

INSIGHTS FROM DATA

The data in Table 3 refer to magnet schools grouped by generation.[6] The grade-progression rates shown furnish an "initial-to-final" comparison. "Initial" here refers to grade progression measured through the fall of the school year in which a magnet program was inaugurated. "Final" refers to progression measured between fall 1989 and fall 1990. The MAGNET87 rates, for example, derive from the aggregate of enrollments in the initial 20 magnet schools in place since 1987. These rates show the aggregate attractiveness and retention of this generation: initially (gauged by progression from fall 1986 to 1987) and finally (gauged by progression from fall 1989 to 1990).

Table 3

Initial And Final Grade Progression Rates For Magnet Schools

	MAGNET87		MAGNET88		MAGNET89		MAGNET90
GRADE PROGRESSION	INIT.	FINAL	INIT.	FINAL	INIT.	FINAL	INIT./ FINAL
K>G1	112	112	112	117	114	153	82
G1>G2	80	94	100	106	103	104	82
G2>G3	93	93	113	116	121	118	94
G3>G4	105	72	144	163	128	120	109
G4>G5	79	96	96	103	96	115	91
G6>G7	249	104	--	--	79	113	94
G7>G8	88	92	--	--	71	85	88
G8>G9	49	41	--	--	54	52	112
G9>G10	65	88	94	107	--	46	59
G10>G11	72	84	69	94	--	--	75
G11>G12	77	87	79	109	--	--	60

NOTE: MAGNET87, MAGNET88, MAGNET89, and MAGNET90 refer to all schools established as magnets in fall 1987, 1988, 1989, and 1990, respectively.

Data unavailable for G5>G6 or for cells with "--".

The question these data can answer is: How do MAGNET87 rates compare with their districtwide counterparts shown in Table 2? Specifically, are there indications that this initial generation of magnets "outperformed" the district, thereby gaining ground for the district?

[6]Incompatible data precluded calculations for all G5>G6 cells and certain other cells in Table 3.

Some grades evidence a clear indication, but others do not. Consider the G9-G10 progression rate. On a districtwide basis (shown in Table 2), this rate was unchanged at 79 both initially and finally. The corresponding rates for MAGNET87 (shown in Table 3) are 65 (initial) and 88 (final). The 23-point gain seen in MAGNET87 schools, then, must have enhanced districtwide retention at this grade level; without that 23-point boost, the final districtwide rate would have slumped below 79. By such logic, we can discern a latent positive influence (signified ahead by ↑).

At other grades, by contrast, the MAGNET87 data display a negative influence (or no influence). The G3-G4 progression rate rose from 88 to 91 districtwide; yet the MAGNET87 counterpart declined from an initial level of 105 to a final level of 72. Here, the 3-point gain districtwide would have been larger were it not for the MAGNET87 generation of schools. By this logic, we can discern a latent negative influence (↓).

The MAGNET88, MAGNET89, and MAGNET90 generations combine the enrollments of the schools opened as magnets in the 1988-89, 1989-90, and 1990-91 school years. For these generations, the corresponding grade-progression rates in Table 3 refer to a progressively shorter span of experience. With MAGNET89, for example, the comparison spans only one year (fall 1988-89 to fall 1989-90).[7]

OBSERVABLE EFFECTS OF MAGNET SCHOOLS

In Fig. 1, the patterns just illustrated are summarized graphically for nonminority and minority grade-progression rates. In each cell, the number adjacent to the large arrow denotes the initial-to-final change (corresponding to a 1986-89 comparison in Table 2) for nonminority and minority enrollment districtwide. Under nonminority, for example, the G1 to G2 panel reports a 9-point increase in this grade-progression rate. The three small arrows denote the direction of "pull" that each magnet school

[7]Note that these aggregate measures for each generational grouping combine the experiences of individual schools whose enrollments may have fluctuated as they were "magnetized" and attracted students either from other traditional KCMSD schools or from outside the district. Only a comparison of the magnet pattern to the districtwide pattern can disclose whether the former actually enhanced the latter, thereby gaining ground for the district.

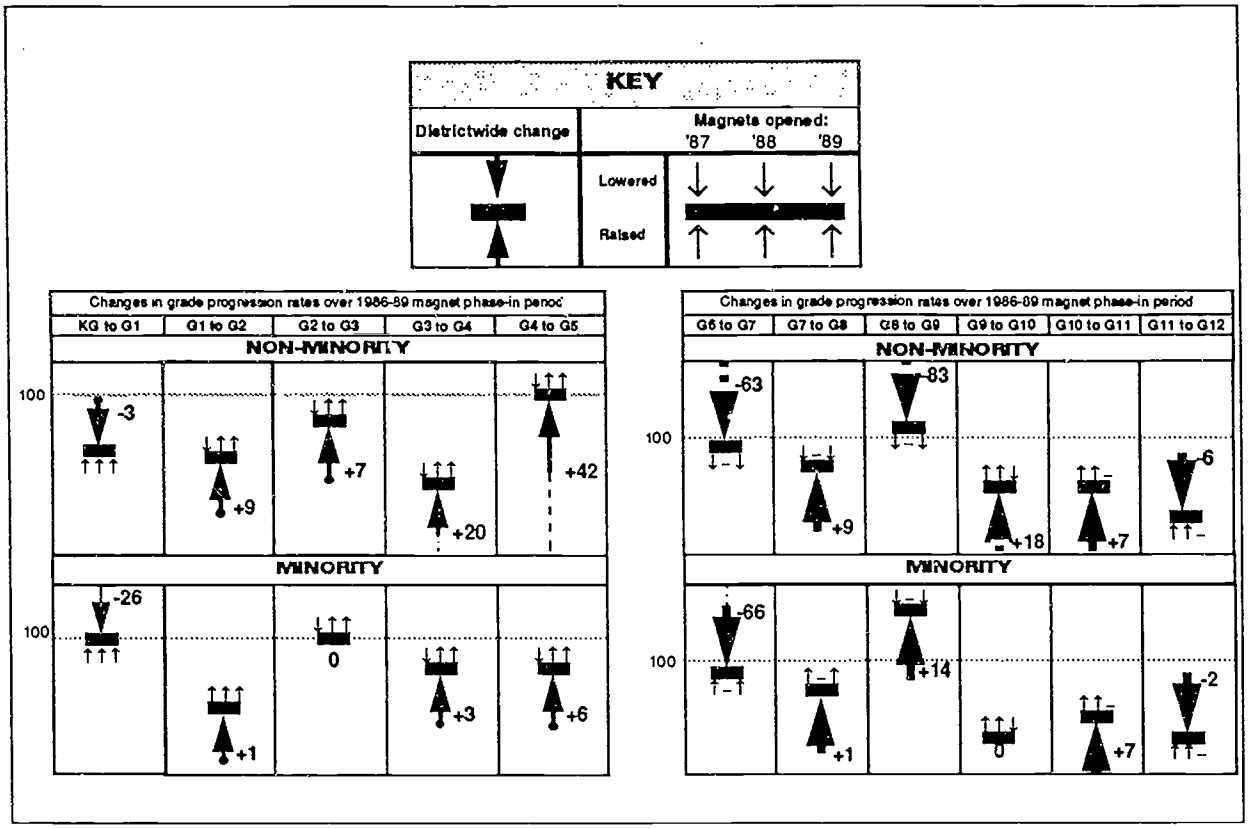

Figure 1—How Magnet Schools Influenced Districtwide Retention at Each Grade

generation conferred—negative (↓) for the MAGNET87 generation, positive (↑) for the MAGNET88 and MAGNET89 generations.

Close scrutiny of the patterns in Fig. 1 shows, first, that KCMSD's magnet schools have exerted some positive influence on districtwide retention at most grades. For the MAGNET87 schools, 11 of the 22 left-hand arrows pull upward (irrespective of the actual direction of change districtwide). For the MAGNET88 schools, 16 of the center arrows pull upward and none pulls downward (a "-" denotes no discernible effect) For the MAGNET89 schools, 12 of the 18 arrows pull upward. Overall, magnet schools have either enhanced retention (e.g., minority G1-to-G2 progression) or slowed its erosion (e.g., G11-to-G12).

Second, magnet schools have not exerted a uniformly or consistently positive influence. Half the MAGNET87 arrows pull downward, signifying that magnet schools operating the longest exerted an influence that was negative as often as positive over the span of their existence. More

generally, fewer than half the progression rates can be classified as actually increasing because of magnet school influence: That is, the number in 13 of the 22 cells is positive, but in 2 of those 13 all arrows point downward. That leaves only 11 of all 22 cells with a number whose positive sign could be attributed to magnet school influence (i.e., at least one arrow pointing up).

IV. FORECASTING APPLICATIONS AND RESULTS

The heart of an enrollment forecast is a schedule of predicted grade-progression rates. Ordinarily, predicted rates are averages of precisely measured rates over several recent years. The extraordinary circumstances in KCMSD, though, leave the forecaster in a quandary. The massive expenditures to improve and "magnetize" KCMSD eventually should strengthen the district's attractiveness to students, nudging grade-progression rates higher. To date, however, one sees little trace of an effect. In light of these considerations, I examined the districtwide grade-progression rates separately for nonminority and minority enrollment to spot any evidence of an upward trend (see Table 4). Certain grade progression rates did display the anticipated trend: For example, nonminority G9-G10 progression rose from 53 to 71 percent and minority G8-G9 progression from 106 to 120 percent. Were such trends authentic, they might justify weighting the latest year disproportionately in calculating predicted future rates. In so many rows of data, however, one is bound to discern trends in a few. The sign test in Table 4, though, reveals only a faint statistical pattern (13 pluses, 9 minuses, and 2 unchanged). Overall, the data are less than convincing that progression rates have increased systematically.

ASSUMPTIONS AND RESULTS

Given the faint evidence of any magnet effects to date, I decided that a prudent course was to allow for the LRMP's ongoing effects without positing any future intensification. Accordingly, I adhered to the conservative approach of averaging the progression rates for the most recent four years (shown in Table 4). Basing a forecast on the average of these recent rates captures (but does not exaggerate) effects insofar as they existed.

My original forecast, prepared in 1990, referred to the three years thereafter. As seen in Table 5, the predicted increase from 1990 through 1993 was 3.0 percent (versus the actual 4.0 percent increase that materialized). Also shown is an update of this original forecast, based on grade-progression rates observed through the fall of 1992 (two additional

Table 4

Grade Progression Rates, by Minority Status

Progression rate from	1986-87	1987-88	1988-89	1989-90	Sign test
		NONMINORITY			
K>G1	99	124	97	96	-
G1>G2	86	101	88	95	+
G2>G3	91	107	94	98	+
G3>G4	70	93	79	90	+
G4>G5	58	130	98	100	+
G5>G6	109	202	104	100	-
G6>G7	161	121	78	98	-
G7>G8	84	109	86	93	+
G8>G9	185	148	96	102	-
G9>G10	53	67	71	71	+
G10>G11	67	93	70	74	+
G11>G12	73	86	72	67	-
		MINORITY			
K>G1	127	155	103	101	-
G1>G2	93	128	91	94	+
G2>G3	101	130	97	101	n.c.
G3>G4	92	130	95	95	+
G4>G5	89	139	96	95	+
G5>G6	120	153	103	107	-
G6>G7	161	133	97	95	-
G7>G8	90	85	86	91	+
G8>G9	106	108	123	120	+
G9>G10	76	99	88	76	n.c.
G10>G11	71	112	80	78	+
G11>G12	72	117	79	70	-

Note: Progression rates are measured as of the fall in the two successive years in each column.

Sign test defined as "+" or "-" by subtracting 1986-87 value from 1989-90 value; n.c. denotes no change.

Source: Calculated from KCMSD annual reports.

Table 5

Comparison of Forecasted and Actual Enrollments

K-12 enrollment	Fall of year				Cumulative change from
	1990	1991	1992	1993	1990
Actual	32,782	33,235	33,495	34,106	+1,324
% change from prior year	--	*+1.4%*	*+0.8%*	*+1.8%*	*+4.0%*
Original forecast (F91=First year)	32,782	33,121	33,481	33,780	+998
% change from prior year	--	*1.0%*	*+1.1%*	*+0.9%*	*+3.0%*
Updated forecast (F93=First year)	32,782	33,235	33,495	33,685	+903
% change from prior year	--	*+1.4%*	*+0.8%*	*+0.6%*	*+2.8%*

Sources: Table 1; Morrison (1991); Morrison (1993).
Note: Shaded area denotes forecast period.

years beyond the basis for my original forecast). Ironically, the updated information degraded rather than improved accuracy relative to the original forecast of 1992-93 change (+0.6 percent vs. +0.9 percent).

Others who prepared forecasts for the early 1990s at approximately the same time posited a range of more speculative assumptions about magnet school effects. Their predictions of enrollments showed increases as high as 3.8 percent annually (versus an actual average increase of 1.3 percent annually from 1990 to 1993).[8]

DIAGNOSIS OF ERROR

The original forecast tracked the actual enrollments reasonably well, and the direction of error switched from year to year (see Table 5). For the first year, the forecast of increase (1.0 percent) understated the actual (1.4 percent) increase. For year 2, the 1.1 percent forecast overstated the actual 0.8 percent increase. For year 3, the forecast once again understated the actual (and with a larger margin of error than before). Cumulatively, the original forecast anticipated a 3.0 percent increase (998 more students), whereas the actual increase was 4.0 percent (1,324 more students). The updated input data for the subsequent forecast produced no improvement in accuracy.

For the original forecast, Figure 2 shows how the deviations of forecasted versus actual fall 1993 enrollments are patterned by grade. Between K and G5 and between G10 and G12, the forecast was consistently short of the mark--most acutely for G12. For the G6 through G9 gradespan, by contrast, the forecast was consistently high. Clearly, some fine-tuning of assumptions for particular grade levels might improve the overall forecast.

Table 6 adds further perspective on these patterns, showing the absolute changes by individual year and also cumulatively over the three-year forecast period. Here, we see that the forecast of net changes tracked the actual net change unevenly from year to year (even though

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[8]The reference here is to a series of forecasts of change from 1990 to 1993 (Tatham and Nagel, 1990) and an "expected projection" of change from 1991 to 1993 (Esselman, 1992).

cumulatively the forecast was close). Again, we see that at the elementary grades, the forecasted change
was consistently low. For the high school grades, the forecasted change was low for year 1 but closer to the actual change in years 2 and 3. For the middle grades, by contrast, the forecasted change was too high initially, but by the third year it was closer to the actual change. Paradoxically, the forecast degraded over time on an overall (net change) basis but not within grade levels.

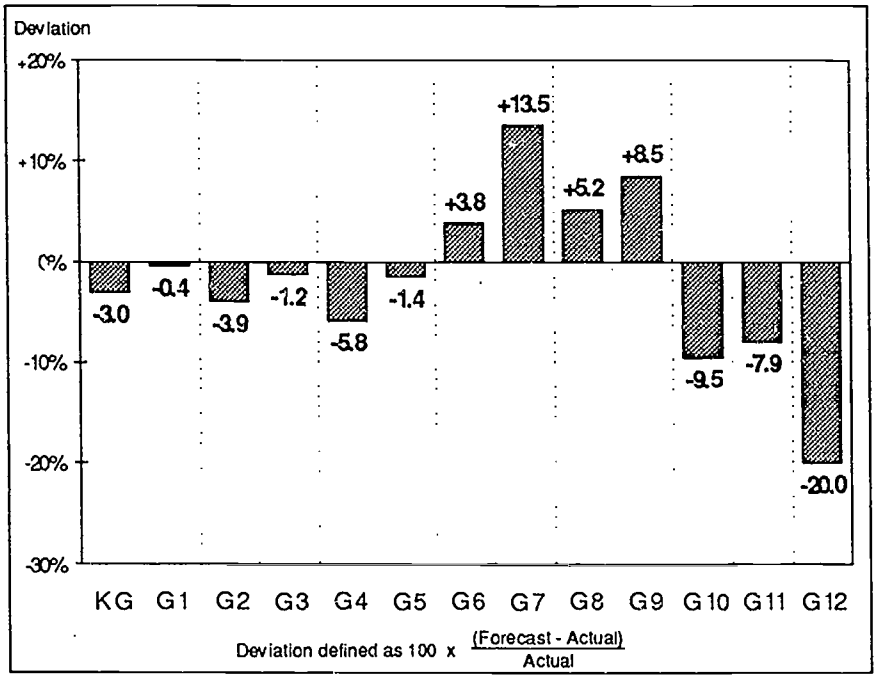

Figure 2—Pattern of Deviation Between Forecast and Actual Fall 1993 Enrollments by Grade

Table 6

Pattern of Annual Deviation between Forecast and Actual Enrollment Change

Grade level	Change in number enrolled by year of forecast			
	First year (F90 to F91)	Second year (F91 to F92)	Third year (F92 to F93)	Cumulative to third year
Elementary (K-G5)				
Forecast	+53	+42	+134	+229
Actual	+126	+226	+370	+722
Middle (G6-G8)				
Forecast	+291	+192	-96	+387
Actual	+17	-125	-56	-164
High (G9-G12)				
Forecast	-5	+126	+263	+384
Actual	+310	+159	+297	+766
Net change:				
Forecast	+399	+360	+301	1,060
Actual	+453	+260	+611	1,324

V. CONCLUSIONS

Enrollment forecasting is both science and art--the science of dissecting enrollment change into its constituent processes and the art of making informative assumptions about the future course of those processes. Conducting it as an exclusively mechanical process may suffice under ordinary circumstances, but even then the assumptions used in the forecast should reflect conscious judgment about the future. Such judgment will sometimes be straightforward, but it is vastly more troublesome in contexts of extraordinary and unprecedented change.

In the application described here, the tension was to balance what had prevailed (based on observation) with what could emerge (based only on speculation). One wants to avoid exaggerating effects that have not yet materialized, but not at the expense of missing them entirely. The approach used here emphasized heightened alertness to any signs that might justify a departure from grade progression rates observed in past years. Examining magnetized schools separately by generation proved helpful in clarifying what changed when schools were magnetized. A key insight was that at most grades, KCMSD's magnet schools had enhanced the district's overall attraction and retention, but did so without producing positive increases at most grades. As often as not, they had merely slowed the overall weakening of retention districtwide.

These insights helped in crafting assumptions appropriate to the forecasting problem. Basing a forecast on the grade-progression rates that prevailed during the magnet phase-in period was more conservative than the approach other analysts had advocated. Three years into the forecast, the pattern of error indicates that the logic has held up reasonably well so far. Based on observable past trends, one could realistically foresee an average annual districtwide enrollment increase of about 1.0 percent (or 333 more students). In fact, KCMSD registered an average annual enrollment increase of about 1.3 percent (or 441 more students).

REFERENCES

Esselman, Mary E. 1992. Summary of KCMSD LRMP Enrollment Projections: 1992/93-2003/04, unpublished.

Kansas City, MO., School District (KCMSD). Annually. Fall Student Census Count.

Morrison, Peter A. 1991. "Analysis of Enrollment Trends and Prospects: Kansas City Missouri School District," January 17, unpublished.

Morrison, Peter A. 1993. "Forecast of K-12 Graded Enrollments for KCMSD: Fall 1993 Through 2000 (Illustrative Version A), table dated January 7, 1993.

Tatham, Elaine and Marlene Nagel 1990. "School Enrollment Forecasts, Kansas City, Missouri, School District: 1990-2000," unpublished.