POSITIVE AND NEGATIVE EXTERNALITIES ASSOCIATED WITH SPECIALIZED INSTRUCTIONAL PROGRAMS

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ABSTRACT

This study evaluates the impact on academic achievement that occurs when student enrollment in specialized education programs rise. It utilized student achievement data from the high school programs in the Los Angeles Unified School District. The specialized programs included in the study are: the gifted and talented education program, the special education for students with disabilities program, and the program for English language learners. The findings indicate that, as student enrollment in a given program increases, academic achievement may increase or decrease not only within that same program but also cause changes in other programs' proficiency rates. That is to say, externalities are generated by changes in the enrollment rates of a specific specialized program. The goal of the study is to provide school districts with information about the externalities associated with their funding distributions, an area in which very limited research exists. However, given the limited sources of funding that districts have, it is imperative that a comprehensive cost benefit analysis take into account the externalities that their specialized education programs yield.

Objective

This study seeks to assess some of the externalities associated with specialized education programs. Specifically, it seeks to evaluate how increased rates of enrollment in certain specialized school programs impact the achievement rates of students in those programs and/or other programs within a specific school. It aims to inform school districts on how the programs in their schools may be affecting not only the students in those programs, but may also be impacting students in other programs. Thus, it provides some insight into the positive or negative externalities associated with specialized instructional programs.[1]

The school programs included in this study are: the gifted and talented program, the special education program for students with disabilities and the program for English language learners. To evaluate these programs' impacts, one school district in California has been selected: the Los Angeles Unified School District (LAUSD). This district is the second largest public school district in the United States. Located in Southern California, it stretches 30 miles south of downtown Los Angeles and as far north as the San Fernando Valley, covering a vast array of urban neighborhoods. There are more than 800 schools in the district with more than 750,000 students enrolled in the 2002–2003 school year. It boasts a diverse and culturally rich student population and offers a diverse set of specialized programs. The ethnic makeup includes a predominant number of Hispanic or Latino students who comprise approximately 70 percent of the district's student population; around 11 percent are African-American students, approximately 10 percent are white (non-Hispanic) students, and about 9 percent are other race groups.[2]

The district's numerous specialized programs seek to provide the most specialized instruction for such a diverse set of students. One of these programs is the gifted and talented (GATE) program. This program provides challenging curricula and instruction to gifted and talented students capable of achieving significantly beyond the level of their peers. The district allocates specific funds for this program, which are used to design and deliver a supplemental differentiated program for individuals or groups of gifted and talented students with special needs. The GATE funding is also used to support Advanced Placement and honors courses in the secondary schools and to counsel economically disadvantaged high-potential students. In addition, GATE funding is used for staff development, to provide teachers with strategies to broaden their ability to provide differentiated curricula and individualized programs to meet students' needs.

Another specialized program within the district is for students with disabilities: those who have been evaluated and deemed to have a physical or mental disability that interferes with their academic achievement. The program's goal is to offer modified and specialized educational services for these students. Some of these students attend the same public schools as regular education students while others go to special schools exclusively for students with disabilities. There is a higher per-pupil spending rate for these students given the increased costs for making the necessary modifications to provide them with a quality education. For example, the teacher-to-student ratios for these students are smaller than for a regular education classroom, and in most cases these students require transportation and other special services.

The third program included in this study is the English language learners (ELL) program, which offers language support for English learners. These students are either placed in a regular classroom where modifications are made for them within that same classroom, or they are pulled out of the classroom for a certain number of instructional minutes per day. In some schools students in the ELL program are in classrooms exclusively for ELL students the whole day. In this case, the separation is aimed at promoting their primary language development. Students are placed in classrooms where primary language instruction is offered while at the same time the students acquire English language skills. These are called transitional programs. ELL funds are used to provide staff development support for the teachers of ELL students, for additional program resources necessary to support the specialized instruction; such as to hire support staff which provides specialized instruction for these students.[3]

Given the increasing number of students enrolling in these specialized programs, and the increased costs incurred by districts that sustain these specialized programs, it is not sufficient to evaluate whether these programs are meeting their objectives. It is also important to evaluate how increased enrollments in these programs affect other programs within the same schools, in order to assess hidden costs or benefits that are tied to these programs. Many districts may be unaware of the externalities associated with their specialized education programs. The goal of this study is to examine some of the externalities these programs yield, in order to assist school districts in making more informed decisions about how to maximize the use of their resources.

Hypothesis

My initial hypothesis is based on information about how schools distribute their limited resources across school programs. Given states' and districts' limited resources, resources available for the other programs will inevitably decrease as the number of students within one program increases.[4] For example, as student enrollment increases in the ELL program, this will detract from the resources for the GATE and the disabled student programs. I presume that this will decrease the achievement rates in those programs.

In regards to the GATE program, I hypothesize that this program will yield a positive externality for students not in GATE; such as the general population group, or students who are economically disadvantaged but demonstrate potential for high academic achievement. I developed this hypothesis based on how GATE funds are utilized. In many schools, these funds not only benefit the GATE students but also other students who are intellectually promising. As the number of GATE students increases, so does the number of honor courses and Advanced Placement courses offered in the high schools they attend.[5] At the same time, I hypothesize that an increased enrollment in this program will also impact the students in the disabled programs, but yielding a negative externality for this group. Again, given that school's resources are limited, I hypothesize that as the number of GATE students increase within a school, the achievement rates of the disabled students will suffer due to reduced resources and attention the disabled students will receive.

Similarly I hypothesize that as the enrollment of special education for students with disabilities increases in a school, more resources will be available; consequently, this should increase the student achievement rate of this group of students. The increase in resources and attention paid to this group will result in higher performance achievements within the group. However, the school's overall achievement averages should decline because despite gains made by the disabled students, their results will still weigh down the overall averages of a school. In addition, because the schools will not have additional resources to support students that may be able to reach proficiency rates if a small increase in resources were allocated to them, these students will also weigh down the general population's averages. Thus, increasing enrollment in the GATE or the special education for students with disabilities programs should generate both positive and negative externalities.

Design

In this study, a cross-sectional non-experimental design is used to examine the impact of the percentage of students enrolled in a particular school program (program size) on the achievement rate of the school's general population, on the achievement rate of the other programs within the school, or on that same program. For example, will the percentage of students enrolled in the gifted and talented program in a particular school affect the general student body's proficiency rate (measured as a proficiency percent) on standardized test results in that school? And/or will it affect the proficiency rate of students in the other programs in that same school? At the same time, it evaluates whether or not increased GATE enrollment will have an effect on that same program's proficiency rates. The programs included in this study are: the gifted and talented program, the special education program for students with disabilities, and the English learners program.

The data includes results of proficiency rates on standardized tests of students in different programs of Los Angeles Unified School District's high schools. Particularly, it uses proficiency rates on California's Standardized Testing and Recording (STAR) test, which is administered to elementary, middle school and high schools students on a variety of subjects. This study utilizes the results on the English language-arts portion of the exam, since data are more widely available for this subject. It uses the percentages of achievement of the subgroups on the English language–arts portion of the STAR tests administered in the spring of 2004 to measure proficiency and student achievement.[6]

The study measures impact by correlating a change in the percent of students enrolled in a specific program (X, treatment variable) to a change in the percent of proficiency achievement of the other population programs or the same program (Y, dependent variable). The data included 93 high schools (N=93x2) in the Los Angeles Unified School District. Two units of analysis were collected per school. One was the results of ninth graders and the other was the results of tenth graders for each high school in the study. It included the majority of high schools in the district, except for a few continuation high schools, for which insufficient data were available. The high schools

excluded from this study were special education high schools, which serve only students with learning disabilities.

Using multiple regression analysis, five different dependent variables are regressed in order to evaluate the impact of the different programs on the dependent variable. The five dependent variables used are: the percentage of proficiency achieved by the total population in the school, the percentage of proficiency achieved by the students enrolled in the gifted and talented program, the percentage of proficiency achieved by the students enrolled in special education programs (with learning disabilities), the percentage of proficiency achieved by the students enrolled in English learning programs, and the proficiency percentage achieved by the students categorized as economically disadvantaged.

The independent variables are the percent of students in the different programs. Thus, the regression model holds constant the percent of gifted students, the percent of students with disabilities, the percent of English learners, or the percent of economically disadvantaged, in order to evaluate the impact on the dependent variables. In addition, it includes robust standard errors in order to test for heteroscedasticity.

Results

Results from the regression model demonstrate that there is a correlation between some of the dependent and independent variables (see Table 1). The first regression model demonstrates that the percent of student enrollment in the gifted and talented program does have an impact on the level of proficiency achieved by the general population in the school. In other words, as the number of students in the GATE program increases by one percent, the overall achievement rate of proficiency in the school increases substantially, as indicated in this model, by 43.9 percent. What this implies is that the school's overall achievement rate is heavily dependent on the number of GATE students in that school, since they are the ones that significantly raise the school's overall achievement. At the same time, the resources utilized by the GATE students may also be benefiting the general population. It is clear that utilizing resources for GATE programs yields positive externalities for the school. Districts should consider these positive externalities when allocating funding for specialized education programs.[7]

The percent of students enrolled in special education programs for students with disabilities significantly affects overall achievement rates as well. Each percent increase of enrollment in the special education for students with disabilities program will decrease the school's overall proficiency rate by 10.2 percent. Another significant correlation is the impact of student's economic status. If the percent of students categorized as economically disadvantaged increases by one percent, the percentage of the school's total achievement will decrease by 7.8 percent. There is no significance between the percent enrolled in English learning programs to the overall achievement percent in the whole school.

Table 1
Impact of enrollment in specialized programs on proficiency rates of the total school population

Independent variables:
% enrolled in the gate program (GATE)
% enrolled in the special education for students with disabilities program (SE)
% enrolled in the English language learners program (ELL)
% characterized as economically disadvantaged (EcD)
(Same independent variables for tables to follow)

Number of observations	=	187
F (4, 182)	=	11.14
Prob > F	=	0.0000
R-squared	=	0.3808
Root MSE	=	12.168

Prof. Total	Coef.	Robust Std. Err.	t	P> | t |	[95% Conf.	Interval]
GATE	43.91267	10.14779	4.33	0.000	23.89022	69.93512
SE	-10.20893	4.302005	-2.37	0.019	-18.69715	-1.720715
ELL	-11.42524	10.92201	-1.05	0.297	-32.97529	10.12481
EcD	-7.846292	3.732245	-2.10	0.037	-15.21032	-.4822596
cons	22.0672	2.449599	9.01	0.000	17.23393	26.90046

The second regression evaluates the impact of the percent enrolled in the different programs on the overall rate of achievement of the students in the GATE programs as noted in Table 2. The research question is whether or not enrollment in the other programs will impact the resources available for the GATE students and thus decrease this group's student achievement rate. None of the variables in this model demonstrate significance. Thus, the achievement rates of students in the gifted and talented program seem to be unaffected by enrollment increases in the other programs. Therefore, if students are categorized as English learners or as economically disadvantaged and these numbers rise within a school, this bears no impact on the achievement rates of students in the gifted program.

Table 2
Impact of enrollment in specialized programs on the proficiency rates of gifted students

Number of obs	=	116
F (4, 182)	=	2.43
Prob > F	=	0.0516
R-squared	=	0.0773
Root MSE	=	20.158

Prof._GATE	Coef.	Robust Std. Err.	t	P> | t |	[95% Conf.	Interval]
GATE	14.61324	11.37049	1.29	0.201	-7.91796	37.14444
SE	54.873233	33.92215	1.62	0.109	-12.34578	122.0922
ELL	-19.94517	18.34791	-1.09	0.279	-56.30277	16.41244
EcD	-8.306142	7.646726	-1.09	0.280	-23.45864	6.846356
cons	70.98387	5.450381	13.02	0.000	60.18357	81.78416

In the third regression, the dependent variable is the percent of the students in the special education program for students with disabilities that achieve proficiency. (see Table 3). The research question again is whether or not the percent of students enrolled in the different programs in a school will have an impact on the achievement scores of students in the special education program. There is one independent variable that yields significance and two that almost reach significance. The percent of student in the special education for students with disabilities does impact the proficiency rate of the same group of students at a significant level: if the percent of students in special education for students with disabilities increases by one percent, the proficiency rate of this same student group increases by 6.3 percent within a school. An explanation for these increases may be that as more students are enrolled in these programs, more resources aimed at increasing student achievement may be invested in these students. Or maybe greater specialization on how to better serve these students is obtained, which leads to a proficiency rate increases. The other variables that almost reach significance are: the percent of students in the English learners program and the percent of students in the economically disadvantaged category. When there is an increase of one percent of students in these categories, the percent of students that achieve proficiency in the students with disabilities program falls by 4.6 and 2.5 respectively within the schools. Thus, increasing enrollment in the English learners program or increasing the number of economically disadvantaged students yields a negative externality for students with disabilities.[8]

Table 3
Impact of enrollment in specialized programs on proficiency rate of special education students with disabilities program

Number of obs	=	114	
F (4, 182)	=	4.83	
Prob > F	=	0.0013	
R-squared	=	0.2135	
Root MSE	=	3.6679	

Prof._SE	Coef.	Robust Std. Err.	t	P> | t |	[95% Conf.	Interval]
GATE	6.347352	3.433817	1.85	0.067	-.4583628	13.15307
SE	5.581504	1.996311	2.80	0.006	1.624881	9.538126
ELL	-4.646034	2.429486	-1.91	0.058	-9.461197	.1691287
EcD	-2.553683	1.325862	-1.93	0.057	-5.181498	.0741325
cons	3.914721	1.033545	3.79	0.000	1.866267	5.963174

The fourth regression investigates whether the proficiency rate of students in the English learners program is affected by the enrollment percentage increases of students in the different specialized programs (see Table 4). There is no significance between the correlations of these variables, indicating that increases in the percentages of student enrollment in the various programs do not impact the proficiency rates of the English learners.

Table 4
Impact of enrollment in specialized programs on proficiency rate of English language learners program

Number of obs	=	107	
F (4, 182)	=	0.79	
Prob > F	=	0.5370	
R-squared	=	0.1801	
Root MSE	=	7.4546	

Prof._ELL	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
GATE	12.26808	9.228743	1.33	0.187	-6.037085	30.57325
SE	-68.17037	40.94442	-1.66	0.0991	-149.3834	13.04269
ELL	26.03922	15.09355	1.73	0.088	-3.89876	55.9772
EcD	.1423602	2.76955	0.05	0.959	-5.351028	5.635749
cons	4.907692	2.581909	1.90	0.060	-.2135121	10.0289

Finally, the last regression model helps to assess the impact of the enrollment in the different programs on the proficiency rates of the economically disadvantaged students. (see Table 5) In this regression, various independent variables yield significance. As the percentage of students in the GATE program increases, the percentage of students that achieve proficiency in the economically disadvantaged category increases dramatically. For whatever reason, whether because the GATE students are also part of the economically disadvantaged category or perhaps because the GATE students motivate other students in the same school, there is significance in this correlation. The proficiency percent of the economically disadvantaged population within a school will increase by 32.4 percent as the percent of the GATE student population rises by one percent. Attention should be given to the positive externalities of this situation, particularly in large urban districts with high levels of economically disadvantaged students. Districts may reap greater benefits from investing in GATE programs than from increasing resources or the enrollment of the economically disadvantaged, since this approach may in effect yield unintended negative externalities. For example, an increase in one percent in the enrollment rate of students in the special education program for students with disabilities or in the enrollment rate of those classified as economically disadvantaged, will cause the proficiency rate of the economically disadvantaged to decrease by 12.4 and 7.6 respectively within the schools.

Table 5
Impact of enrollment in specialized programs on proficiency rate of economically disadvantaged students

Number of obs	=	169	
F (4, 182)	=	12.97	
Prob > F	=	0.0000	
R-squared	=	0.3846	
Root MSE	=	10.007	

Prof._EcD	Coef.	Robust Std. Err.	t	P> | t |	[95% Conf. Interval]	
GATE	32.37249	7.383287	4.38	0.000	17.79394	46.95105
SE	-12.44228	3.861818	-3.22	0.002	-20.06757	-4.816989
ELL	-9.696203	8.86724	-1.09	0.276	-27.20488	7.81247
EcD	-7.551966	3.661128	-2.06	0.041	-14.78099	-.329429
cons	21.62844	2.609726	8.29	0.000	16.47545	26.78144

Discussion

This study has demonstrated that as the percentage of students enrolled in a specific program in schools increases, there is an impact on the proficiency rates of students in that same program or in the other school programs. Impact was clearly significant when the percentage of students in the gifted and talented program increased. This causes an increase in the proficiency rates of the total school population and within the students categorized as economically disadvantaged. This can be expected, since the gifted students are also counted within the general population's proficiency totals and can also be part of the economically disadvantaged category. GATE funds also benefit other students not in GATE, given that the number of rigorous courses offered in the schools increase when there are more GATE students in the school. This increases access to honors and advanced placement classes for the general population. Thus, an increase in the percent of students in the gifted program will have a significant impact in raising the achievement rates of the general population and the economically disadvantaged group, which is a positive externality school districts should factor into their funding decisions.

This study does not address the causes of those changes but merely addresses an impact. The model is measuring the change in proficiency rates obtained by a program as the percentages in the enrollment in that or another programs increases. In the case of the GATE program, for instance, if enrollment increases, it is not known if the impact in increasing proficiency rates in the other programs is mainly due to the GATE's achievement impacting the other programs as the GATE's proficiency rates are included within those percent totals, or for other reasons. It may be that, as the number of GATE students increase, this group's high achievement rates stimulate the general population to increase their achievement rates. Another possible explanation is that the school's general practices are contributing to the increased achievement of more students and, therefore, not only are more GATE students identified, but the effective teaching practices are impacting other students as well. Since the impact of the percent of GATE students

drastically affects the other groups, it is reasonable to hypothesize that the increase in GATE students also serves to stimulate the greater achievement of the other groups.

Another interesting finding is the impact of the increased percent in enrollment in the learning disabilities group on the proficiency rates of other programs and on its own. As already mentioned, the percentage increase of the special education program for students with disabilities will cause overall population proficiency rates to decline for the general population and for the economically disadvantaged groups. However, increases in the percent of students with disabilities will positively affect students in this same group. Again, the reason for this impact is not known. One hypothesis is that as the percent of students with learning disabilities increases within a school there is a corresponding increase in the amount of resources and attention given to this student group; perhaps more qualified teachers and/or additional support staff is hired in order to better serve this school's population group. Another explanation is that those schools with a large population of special education programs for students with disabilities are developing expertise on how to effectively teach these students. Inevitably, though, as the percent of students in this category increases, the proficiency rate of the general population will decline, as well as the population rate of the students that are economically disadvantaged, since it will decrease the overall proficiency percent achieved in the school. Further study in this area can assist districts in balancing the positive and negative externalities found in this situation.

The strength of this study's results depends on the internal and external validity of the non-experiment. First, in regards to the measurement of the independent variables, random measurement error is not likely to be a problem in this study, as the data comes directly from the test results of the students as recorded by educational testing services and reported by the Los Angeles Unified School District to the California Department of Education. Percentages measure the total enrollment of students under a specific program, and the proficiency percents measure the percent of students that obtain these proficiency levels on the specific standardized exam.

Simultaneity is likely to be a threat to internal validity, particularly in the case of gifted students. The regression model assesses correlation between the percent of students enrolled in the gifted and talented programs and achievement on the proficiency rates of the overall population, in one of the cases. Simultaneity may be a threat to internal validity because, instead of the increase in percent of the gifted students impacting the general population's achievement rates, the high achievement rate of the general population may encourage a school to identify more gifted students. Similarly, the lower achievement rates of certain students can cause that school to evaluate more students for special education consideration and thus end up placing more students in instruction for students with disabilities. Therefore, there is simultaneity threat to the extent that the increased number of students in a group may be influencing the achievement rates of other groups of the same group, or that the achievement results are influencing the increased number of students that are placed in the specific program due to the results in their exams.

Omitted variables bias is another threat to the experiment's validity. Other variables may be strong determinants in the school's proficiency rates within a specific program. For example, the students' race and their attendance rates may greatly impact the proficiency rate of certain groups of students, more so than the size of a certain program. Thus, one of the limitations of this model is that it did not include these variables, when in fact some of this information is available for the Los Angeles Unified School District. The California Department of Education provides proficiency results for the districts, categorized by the percentage of proficiency for students within a racial group.

One thing that was attempted and made no difference in the regression results was to include dummy variables. A dummy variable for the ninth grade was included and one for the tenth grade in order to control for the two different grade results. However, the regression results did not demonstrate changes when including the dummy variables.

Conclusions

The goal of this study is to evaluate the impact of increasing the enrollment in specialized instructional programs. Certainly there is a lot of controversy regarding specialized instruction for specific groups of students.[9] The question has usually been based on whether the funds invested in the particular programs are producing results in increasing student achievement for the students in those programs. However, deeper analysis should include evaluating the externalities that those programs bear. There is added value for a school when it expands its GATE programs, for instance. Despite it being an exclusive program aimed at offering more rigorous and specialized instruction for the academic elite, it is also benefiting the school's general population and the promising economically disadvantaged students.

Investing in programs for the disabled within a school also yields positive benefits, particularly for that same group of students. As the number of students increases within this group, that group achieves higher academic results. Many times however, schools are more interested in raising their overall achievement scores and not necessarily interested in increasing the proficiency percent of a specific group. In such cases, investing in the GATE program over the special education program for disabled students will be preferred.[10]

Further research that expands on this study will be necessary to continue to assist school districts in making decisions about how to use their funds. This study, although it supports the initial hypothesis and demonstrates significance across various relationships, should be interpreted with caution. There are limitations regarding the external validity. The district used in this study is one of the largest and most culturally diverse in the country. Few other districts have the same demographics and number of specialized programs as does LAUSD. Therefore there are limitations to its external validity. Still, this study should assist many districts in deepening their analysis as they make spending decisions for specific programs.

[1] Limited research exists in this area, but background on this subject can be found at: Susan Berger and Jane Burnette, *Educating Exceptional Children: A Statistical Profile,* ERIC Clearinghouse on Disabilities and Gifted Education, Arlington, VA, 2001.

[2] This statistical information was taken from the website of the Los Angeles Unified School District: http://notebook.lausd.net/portal/page.

[3] Program definitions are also from the LAUSD website.

[4] More information about spending distributions can be found at: Bruce D. Baker, *The Economic Health of Gifted Education in Three Northeast States: An Analysis of Public School Opportunities and Private Programs in New York, New Jersey, and Connecticut* (New York, NY: Department of Educational Administration, Teachers College of Columbia University, 1995).

[5] Ibid.

[6] Data used in regressions in this study were obtained from the website of the California Department of Education: http://www.cde.ca.gov/.

[7] Research justifying increasing GATE spending can be found at: Charles R. Schindler, "Ethical Dimensions of Education for the Gifted: How do We Determine Which Gifts to 'Unwrap?'," *The Journal of Negro Education*, Vol. 53, No. 2 (1984), Howard University.

[8] Although research on the externalities of specialized education programs was not specifically found, research in the area of inclusive specialized education program effects can be found at: Nancy Burnstein, Sue Sears and Anne Wiscoxen, "Moving Toward Inclusive Practices," *Remedial and Special Education*, Vol. 25 (Mar/Apr 2004), Austin, TX.

[9] Controversies in regards to GATE programs, specifically the under representation of African American and other minority students can be found at: Donna Y Ford, "Desegregating Gifted Education: A Need Unmet," *The Journal of Negro Education*, Vol. 64, No. 1 (Winter, 1995), Howard University, 52–62.

[10] A coalition in Florida, the Miami Metro Action Plan highly supports expansion of GATE identification and effective instructional programs for Gifted Students: Gary R. Rito, "Teaching Enrichment Activities for Minorities: T.E.A.M. for Success," *Journal of Negro Education*, Vol. 58, No. 2 (1989), Howard University.