Uncommon School Spending, Uncommon Results:
A Fiscal Analysis of Spending in New York State Schools Closing Racial Test Score Gaps

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This paper is an extension of case studies completed by the authors for the New York State Education Department. To summarize findings for use in this current study, we use text from the case study report, cited as: Chellman, Colin C., Meryle Weinstein, Leanna Stiefel, and Amy Ellen Schwartz (2005). *Uncommon Schools, Uncommon Results: Case Studies of Three New York State Schools Closing Racial Test Score Gaps,* Albany, NY: Education Finance Research Consortium, New York State Education Department. (www.albany.edu/edfin/EFRC_pubspage.html).

Abstract
Do schools that have been successful at reducing test score gaps between white students and students of color allocate resources differently than unsuccessful schools? This paper aims to answer that question, as there is little work at the school level correlating education expenditures to student outcomes. This analysis benefits from three features of expenditure data available in one New York State school district. The first is that these data are available at the school level, not the district level as is often the case. Second, not only overall levels of spending per pupil are available (i.e., total spending per pupil and total instructional spending per pupil), but also functional areas of spending disaggregated to such line items as professional development, classroom paraprofessionals, and principal compensation. Third, the spending data allow us to analyze expenditures on these line items not only for all students but also for two types of students: full-time special education and general education.

Up to this point, the literature linking financial resources to student outcomes does not strongly support a relationship between school inputs and outputs. However, not much of that work has benefited from the same disaggregated, school-level spending data for different types of students. It is hoped that this analysis -- combined with lessons from previously completed case studies of three successful schools -- will contribute some insight into the mechanisms involved in reducing test score gaps in middle and elementary schools. In the end analysis, we find that successful schools, despite instructional level and despite type of student, spend significantly more (statistically) on human resources than on other sorts of resources such as textbooks, library books, or instructional supplies, computer, and equipment. This overarching lesson reflects that taken from the original case studies: our analysis suggests successful schools emphasize human resources, resulting in better teacher and administrator attitudes, lower turnover, and teachers who are more satisfied with their school's leadership, which in turn lead to better-educated students and environments that allow for test score gaps to be eliminated. Further, we find that disaggregated data -- such as those provided for this study -- are necessary as statistically-significant measures of activities taking place inside schools.

Introduction

Broadly, a great deal of attention has been paid to the resources either budgeted to or expended on public programs, and those resources have been used as proxies for the quality of services provided. Public provision of education services differs from other areas of public expenditure because direct measures of outcomes are available through standardized test results at the federal, state, and local levels. Starting with the release of the Coleman Report (Coleman *et. al.*, 1966), popular interpretations of the evidence conclude that schools and money do not matter. These interpretations are incorrect -- e.g., Hanushek (1992) shows that schools (rather, a series of good teachers) are able to compensate for educational differences arising from disadvantaged family backgrounds -- but these interpretations suggest that there are some serious problems with government provision of education services in some, perhaps most, locales because purchased inputs to schools have not been found to be closely related to outcomes (Hanushek, 2002). The view commonly expressed through the press and by most of the public is that

variations in the level of school resources will result in associated variations in the quality of education provided as measured by student performance and other outcomes. However,

> Student achievement involves a complex mixture of educational inputs including the student's own abilities, the influence of parents and friends, and the impact of schools. These factors are not easily separated, so that individuals themselves may have trouble assessing the independent influence of schools. (p.22; Hanushek, 2002)

Therefore, merely tracking aggregate levels of education spending -- Total spending per pupil, Instructional spending per pupil, and Teacher spending per pupil -- is unlikely to uncover any important differences between successful and unsuccessful schools. However, there is some evidence that the mix of spending -- or spending levels disaggregated to line items or functional spending categories -- is a more accurate representation of school practice than more than aggregated data, but the data have not been available. For our analysis, we take advantage of data unique to one district in New York State that provides detail not only at the level of functional category (see Appendix 1 for a list of categories), but also broken into spending on two types of students, full-time special education and general education. We address the question of whether there is any difference in the resources spent in schools that have and have not been successful at reducing test score gaps between white students and students of color, based on hypotheses drawn from previous case studies of successful schools completed by the authors.

Literature

The literature linking resources to outcomes does not strongly support a relationship. Consider the problem of finding a measure for school quality using either inputs or outputs, as described by Hanushek (2002, p.13):

> Relying on standardized tests to provide measures of quality is controversial in part because of gaps in available evidence [that test scores represent quality of education -- pure schooling effects -- rather than home, community, or peer factors, or innate cognitive skills] and in part because of the [policy] conclusions that tend to follow… The contrasting view emphasizes measuring "quality" by the resources (i.e., inputs) going into schooling… A substantial part of the controversy relates to the adequacy or effectiveness of expenditure or resource measures as a proxy for worker skills… In the end, cognitive skills measures appear to be the best available indicators of quality and do relate to outcomes that we care about, where resource measures are quite inadequate.

Further,

> The financial aggregates, particularly expenditure per pupil, are typically not even calculated for the classroom or the school, but instead are only available for the school district or for entire states or nations. As a result, studies employing these are typically the most aggregated studies, a source of analytical problems… The measures of other school resources typically are measured poorly and tend to be available only at the district level. (Hanushek, 2002; p.30)

The analytical problems of using aggregate measures of spending are demonstrated in the literature examining whether resources inputs matter to student outcomes. Burtless (1996) most prominently focused attention on aggregate measures in his volume, which asks, *Does Money Matter?* Evidence from this and subsequent work offers a paradox: while some researchers find that extra resources seem to play little role in improving test scores, other analysts suggest that students educated in well-financed schools achieve better outcomes later in life (Card and Krueger, 1996). Money must matter, but it seems to depend on what specifically that money buys.

The assumption behind the use of spending measures is that money is spent effectively. That assumption is not entirely valid unless there is evidence of effectiveness controlling for type of students (poverty levels, for example) and other factors. When these factors are taken into consideration, schools do seem to matter to educational outcomes, especially according to teacher quality research. Contrary to conclusions from Coleman *et. al*. (1966), schools are able to compensate for disadvantaged family backgrounds. Hanushek (1992) and Rivkin *et. al.* (2001), for example, show that a series of good teachers can close achievement gaps between poor and non-poor students. In addition, Murnane (1975) shows that principals can identify variations in teacher quality, implying that teacher quality differences are observable.

As Hanushek (2002) summarizes, some of the most commonly employed measures of school inputs include: 1) real classroom resources (teacher education and experience, as well as pupil-teacher ratios); 2) financial aggregates (expenditure per pupil and teacher salary); and, 3) measures of other school resources (specific teacher characteristics, administrative inputs, and facilities). Hanushek and Rivkin (1997)

examine the proportion of expenditures spent on classroom versus administration and find that the proportion spent directly in the classroom has fallen over time. The authors note that many would consider this wasteful, however, without considering the uses of this spending and their effects on students, it is difficult to support efficiency judgments. Unfortunately, little work has concentrated on expenditures outside the classroom because data are not available at all, not available at the school level, or are inaccurate, as even the definition of administrative expenditures can be controversial across districts. Similarly, resources such as libraries are most often noted by whether they exist or not without measuring quality or even quantity of resources offered to students.

To this point, we have laid out the data and analysis problems in using financial aggregates. However, we should examine the results of using these measures. Hanushek's meta-analysis (1997) of education production function studies and financial aggregates[1] shows that 14 percent of the estimates of pupil-teacher ratios and less than 10 percent of estimates of the effects of teacher education were positive and statistically-significant. He notes that total per pupil expenditures have received the most attention in education production functions, but only 27 percent of estimates were positive and significant.

Considering these criticisms, we moved forward with our fiscal analysis based on several strengths of our design. First, from our previous case studies (summarized briefly in the section below), we have an insight into the uses of resources within successful schools, providing a look inside the "black box" of successfully educating students that is defined by highly aggregated spending measures. Second, very little past research has benefited from the quality of data used for this study: i.e, disaggregated, school-level spending data for different types of students. Third, past research has not used teacher salary data broken down into types of compensation (benefits versus salary) and types of teachers (full-time, preparatory period, substitute teacher/part-time teachers, other types of compensated supervision by

[1] Including only those studies that incorporated family background measures into their analyses, as that was considered to be a minimum standard for the quality of analysis: he cites evidence showing that family background is generally correlated with school resources and with student outcomes.

teachers such as after-school activities). Fourth, our analysis is based on data directly attributed to decisions made at the school level; we do not include spending that is allocated from the district to the school level on a per pupil basis, as the school has little control over those funds. Fifth, functional categories of spending are directly comparable from school to school as all school-to-school analyses are within the same district with the same expenditure reporting system. It is hoped that this analysis -- combined with lessons from previously completed case studies of three successful schools -- will contribute some insight into the mechanisms involved in reducing test score gaps in middle and elementary schools.

Background

This fiscal analysis is an extension of case studies completed by the authors for the New York State Education Department (Chellman *et. al.*, 2005).[2] The case studies examined schools with atypical racial test score gaps, where students of color have "beaten the odds" by performing as well as or better than white students. Using a unique dataset of student ELA (English Language Arts) and math pass rates for all schools in New York State, we identified these atypical schools and described them statistically. We then chose three schools for study using qualitative methods of inquiry (including principal interviews and teacher surveys) that work with hypotheses from other qualitative studies of school-level test score gaps. Findings of the qualitative work suggest a number of factors that may contribute to school success in eliminating gaps.[3]

Teachers' and principals' belief that home factors have a profound effect on student performance could imply that school faculty and staff are abdicating responsibility for improving student performance.

[2] For further lessons concerning test score gaps stemming from this work, see Stiefel *et. al.* (2003; 2005b).
[3] While there is considerable evidence of the persistence of gaps in academic performance between white students and students of color in both state and national data on standardized test scores, the causes of these gaps – in particular the role that schools play in maintaining the existence of these gaps, are less well understood (Hedges and Nowell, 1998; Cook and Evans, 2000; Fryer and Levitt, 2004). The research does indicate, however, that students, teachers, principals, and the structure of schools all may contribute to these gaps.

However, what seemed to matter was how teachers and principals acted on this belief. The school faculty in our study appeared to take on the challenge of home factors by improving their own instructional practices, using data and on-going assessments to better identify students who needed the most help and attention, and taking advantage of strong leadership to focus instruction, avoid unproven fad practices, and allow teachers to be creative while still adhering to state standards.[4,5]

Although most teachers expressed an interest in -- and belief in the importance of -- more parental involvement, principals pointed out that, despite parents' inability to be more involved in school (because of a lack of transportation options, unusual work hours, etc.), parents were involved in other ways. All three principals noted the importance of parents' expectations for their children. Principals perceived that parents made clear to their children that they were expected to do well in school, and that parents would not appreciate being called to speak with the child's teachers or principal because of poor performance. Students seemed to be reacting positively to these expectations.[6]

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[4] There is compelling evidence that students taught by higher quality teachers outperform those that are not (Hanushek, 1992). While researchers agree that some teachers are more effective than others, they do not agree on what makes a good teacher. In looking for teacher characteristics that explain differences in effectiveness, researchers have focused on education level communication skills, and teaching experience. Teacher experience and high teacher turnover have also been found to work against efforts to efforts to improve poorly performing students' achievement (Snipes *et. al.,* 2002; Huggins and Celio, 2002). Research on teachers has also identified the impact of teacher expectations on student performance and have found that teachers have lower expectations for black students and that these lower expectations have a disproportionate effect on black students' achievement (Rothman, 2001-02; Ferguson, 1998a; Huggins and Celio, 2002).

[5] School leadership is another area in which research and policymakers have focused attention to reduce test score gaps. The Connecticut Commissioner of Education, for example, is going to propose that promising students in school administration programs receive tuition reimbursement in return for working in targeted urban districts in the state (Sternberg, 2004: 10). In a study of school organization and leadership, Chubb and Moe (1990) find that differences in school-level effects are largely due to the internal organization of schools; they argue that public schools are bureaucratic and encumbered by an institutional framework governed by direct democratic control. They conclude that private schools are more effective than public schools because private schools are similar to market participants, possessing autonomy, clear missions, strong leadership, and worker professionalism. Berliner and Biddle (1995) concluded that teacher and administrator autonomy was the most important influence on student achievement. The hypothesis that principal autonomy and strong leadership help teachers and students excel is compelling.

[6] Parental expectations and involvement in their children's schools are topics mentioned in the literature as possibly having an effect on student achievement. Research has highlighted differences in between black and white parents in how they approached school faculty and staff to advocate for their children (Lareau and Horvat, 1999). This work raises important concerns about the ways schools try to engage parents (CDE, 2003).

Teachers and principals in the case study schools believed that students benefited from relationships with students of different backgrounds.[7,8] Unfortunately, most schools in New York State do not offer this opportunity because of racial segregation (both residential and school segregation). Leaders in the schools we studied stated that they made little effort to get students to interact -- students did this "on their own," implying that the level of interaction needed to bring about good student outcomes is outside the control of schools.

The successful schools we studied all had a strong immigrant presence. However, a strong immigrant presence did not make our successful schools different than most other (less successful) schools in the districts we studied; both school districts containing our case study schools had large immigrant populations. Rather, the key component of immigration status may have been parental expectations of student performance that could have important peer effects within, if not across, schools.

Teachers and principals also highlighted the importance of data, on-going assessments, and data analysis tools to help them identify low-performing students.[9] Teachers may have found this the best way to overcome home factors that may have placed some students at an academic disadvantage. Also, teachers'

[7] The peer effects hypothesis contends that decisions about study habits, standards of behavior, and the kinds of classes a student takes are shaped as much by peers as by parents. Some researchers have hypothesized that schools with test score gaps might engender cultures that inhibit students of color from taking more challenging classes or face less competition to do well from their fellow students (Ferguson, 2001; Orfield, 2001). Additionally, Wells and Crain (1994) found that African-Americans who attended desegregated schools benefited over the long-term because of superior connections to the "white world," but they also found few short-term benefits as measured by test scores.

[8] A lack of interracial contact among students in elementary and secondary school has been found to have negative impacts (vis-à-vis test scores, years of education, and earnings) on black children (Hanushek *et. al.,* 2001).

[9] Increasingly, states and districts are providing schools with disaggregated data that can help teachers identify low-performing students. And by identifying students early who need the most help, teachers can intervene early in a student's education (Huggins and Celio, 2002). Studies have found that collecting, organizing, and presenting data to teachers and principals is a key component in helping schools and students succeed (Symonds, 2003; Snipes *et. al.,* 2002; NEA Foundation, 2003). Using data alone, however, cannot reduce test score gaps or improve the performance of the lowest-performing students. Professional development for teachers in interpreting data, translating data into effective instructional strategies, and then targeting low-performing students for specific instruction are all characteristics of professional development programs in successful schools identified in the literature (Huggins and Celio, 2002; Snipes *et. al.,* 2002). The literature also suggests that teachers should receive training not only in interpreting data from state exams, but also understanding how results from their own ongoing assessments can be translated into instructional practices to improve student learning (Rothman, 2001-02).

use of on-going assessments improved the impact of data in identifying not only the students who needed extra attention, but also the areas where students needed help (especially those students who needed help in only one of many fields in which they were tested.) Principals in this study allowed teachers to be creative in following up on what they learned from the data. This belief in the abilities of teachers to address the needs of their students may have stemmed from the principals' stated ability to hire teachers they thought best met the needs of the students in that particular school. Teachers also held high expectations for all their students and communicated those expectations regularly.

Despite the economic disadvantage of most of the students in the schools we studied, a number of school strategies appeared to help overcome the negative effects of home factors. These potentially beneficial characteristics of schools and personnel included: school leaders who believed in their teachers' abilities enough to let them be creative in meeting their students' needs; data and analysis systems that helped teachers identify which students needed extra help and in what areas; high expectations for student performance on the part of parents, teachers, and principals; and the natural interaction between students of different backgrounds that may have contributed to building an environment conducive to student success. Although further research would strengthen these conclusions, the additional evidence provided by these successful schools in New York State could be useful to formulate future gap-closing policy across the state.

To that end, we endeavor in this paper to draw further evidence by analyzing the spending patterns of two of our case study schools in one large, downstate New York district.[10]

[10] Expenditure data for this analysis are only available for two of the three case study schools, hence the exclusion of one school (from a small urban, upstate New York district).

Hypotheses

The following is a list of functional spending categories -- as well as revenue streams (grants) and teacher salary variables -- we might expect to be significantly different based on previous findings. A full list of line items reported at the school-level for the large, downstate school system is included in Appendix I.

1) Overall Spending: Expenditures will be higher in successful schools

- variable: Total spending per pupil

2) Instructional Spending: Instructional expenditures will be higher in successful schools

- variable: Instructional spending per pupil

3) Teacher Spending: Teachers at successful schools will have higher salaries

- variable: Teacher instructional spending per pupil (from expenditure reports); Teacher salary and benefits per teacher (from payroll system data)

4) Leadership: The principals we interviewed had been in their schools for quite some time and had a great deal of experience, therefore, salaries might be higher in successful schools.

- variables: Principals, Assistant Principals

5) Data-driven instruction: Spending on computers and data systems might be higher in successful schools considering that the case study schools used data to drive instruction.

- variables: Grants, Title III/Technology; Classroom instructional supplies and equipment; Leadership supplies and equipment; Ancillary Computer Systems

6) Professional development (specifically concerning literacy instruction and use of data to guide instruction): Teachers and principals in successful schools not only had access to data, but also knew how to use data to address student needs, therefore professional development spending might be higher in successful schools (although we cannot tell on what types of programs the school spent its professional development money). In addition, teachers reported receiving professional development specifically on literacy instruction, therefore professional development spending might have been higher driven by these expenditures as well. The assumption is that extra funds were spent on literacy instruction training rather than displacing other types of professional development.

- variables: Professional development

7) Parent involvement: Through our previous work, we found that parents were involved in their students' education, although they tended not to be involved in their children's schools directly. It is expected that spending on parental involvement will not be higher in successful schools compared to unsuccessful schools.

- variable: Parental involvement

8) Bilingual education: We found that our case study schools were educating a number of immigrant students. Perhaps part of their success was increased spending on bilingual programs in those schools.

- variables: Grants, Federal ELL; Grants, State Bilingual; Grants, Emergency Immigrant Education

9) Grants: It is possible that alternative sources of funding have been sought and found by successful schools.

- variables: Private Grants; Grants, Capital Projects

Methods and Data

We do not expect to write a causal story from the expenditure data that are available. Rather, we hope to describe in some detail the differences in spending patterns between successful and unsuccessful schools that might help provide a more complete case study of successful schools, with some transferability of lessons learned to other school in New York State. To this end, we use independent sample t-test to highlight statistically-significant differences in means for functional spending categories in two of the three case study schools. Independent samples t-tests have the benefit of being simple, straightforward, and easily interpreted. A multivariate analysis would allow us to control for other factors that may affect spending, however our goal is not to tell a causal story, rather to tell a descriptive story that will augment the qualitative case study work we have already produced.

We examine data on both teachers and spending, drawing on two sources of publicly available school-level data from 1998-2002 on this district's elementary and middle schools: teacher salary files and school-level expenditure reports. These expenditure reports provide richly detailed information on school-level spending.[11] From the teacher data files -- which are drawn from the district's payroll system -- we derive a number of measures of average teacher salary and pupil-teacher ratios, which provide slightly different perspectives on teacher resources. Average teacher salary includes salary expenditures on all teachers divided by the number of full-time equivalent teachers. Average teacher salary and benefits is further disaggregated into Full-time teachers, Full-time plus Prep Period, Part-time teachers, and Other teachers -- compensation for teacher supervision of after-school and other activities and clubs. In addition, these teacher compensation variables from the district payroll system are disaggregated into variables for benefits, payments for preparation periods, substitute teacher spending, and spending on teacher involvement in school activities. If we think that salaries reflect productivity, this measure tells us

[11] In 1997, this downstate district became the first urban school system to publicly report spending at the school-level. The data were first made available only in budget form for the 1995-96 school year. In subsequent years, expenditure reports were also available. Given the near year-end date of the budget reports, the two versions – budget and expenditures – did not vary substantially. Thus, the district suspended publication of the budget form of the reports.

something about the quality of teachers. The pupil-teacher ratio gives a sense of the instructional adults per pupil, without any weighting for differences in their salary or education. While teachers are one of the most important resources available to schools, one cannot overlook other spending. The expenditure report covers more than 50 functional categories of spending and in our analysis, we include a subset of key categories as well as total spending, total instructional spending, and various non-instructional categories. Instructional resources include expenditures for classroom instruction (for example, teachers, educational paraprofessionals, and summer and evening programs) and instructional support. Non-instructional categories include leadership, supervision and administration, ancillary (e.g., food services and transportation), and building services (e.g., leases, custodial services, building maintenance and energy costs). Non-instructional expenditures at the superintendent and system levels are distinguished as well, but are not used in this analysis as they are allocated to schools on a per pupil basis instead of reflecting actual direct expenditures.

Figures compared are not adjusted for inflation as the focus of the comparison is not over time, rather between groups. Figures are also not adjusted for geographic cost differences as the school-level spending examined is within one school district. Successful and unsuccessful schools are divided by instructional level, as more is spent per student in elementary schools than in middle schools (and high schools, for that matter) in NYC. This also allows us to place our case study schools in the distribution of all successful school spending. Because there are great differences in the amount spent on students in different education programs, the expenditure reports disaggregate school spending for three types of students: expenditures for all students, for full-time special education (FTSE) students only, and for general education (GE) students only.[12] For our analysis, we will focus on the latter two categories, as spending on all students is simply the sum of FTSE and GE; changes in spending on all students is driven by either

[12] Due to a recent reporting change, spending figures for general education students also include spending for part-time special education students – those receiving resource room support at some point during the school day. Therefore, general education spending is more accurately general education spending plus part-time special education spending (PTSE). The data do not provide adequate detail to subtract out PTSE.

FTSE or GE. In addition, because of the wide range of school sizes in this district, spending is normalized on a per pupil basis.

If we are looking for differences in where schools spend their money, how do we define the groups to be compared? Ultimately, we will want to see if there are differences between successful and unsuccessful schools in one large, downstate New York district. Successful schools are defined as all schools in this district with "small" or "non-traditional" gaps[13] between white students and students of color in both English Language Arts (ELA) and Math exams (4th or 8th grade) in both 2000-01 and 2001-02 (limited to "integrated" schools, defined as those schools with at least 10 or more white and non-white students taking ELA and Math exams[14]). The number of schools in this group includes:

- Elementary schools (defined as those with 4th grade students): 24 schools
- Middle schools (defined as those with 8th grade students): 11 schools

Unsuccessful schools are defined as all schools with "traditional" gaps between white students and students of color in both ELA and Math exams (4th or 8th grade) in both 2000-01 and 2001-02 (again, limited to "integrated" schools). The number of schools in this group includes:

- Elementary: 86 schools
- Middle: 45 schools

[13] Schools were placed into three categories depending on their test score gaps: "Small" was defined as a gap in ELA and Math pass rates between white students and students of color of plus or minus 5 percentage points, "non-traditional" gaps were those where students of color out-performed white students by more than five percentage points, and "traditional" gaps were those where white students out-performed students of color by more than five percentage points.

[14] High levels of residential segregation across New York State are reflected in highly segregated schools (Stiefel, *et. al.*, 2003). Since obtaining statistically-valid gap measures of test score gaps requires a minimum number of students in each group to be compared -- if there are no students of color, there is no test score gap -- we placed an arbitrary minimum student number of 10 on each subgroup. This number was chosen based on the most up-to-date (at the time) New York State subgroup reporting minimums as outlined in the state's No Child Left Behind accountability plan submitted to the US Department of Education.

We analyze spending not just in the two years for which we were provided test score data disaggregated by race (2000-01 and 2001-02), but also in the preceding two years to discern whether past patterns of spending persist and might have a lagged effect on student performance.

Results

All successful schools compared to all unsuccessful schools in the district. As expected based on the literature, there are very few statistically-significant differences in aggregate spending (i.e., Total spending per pupil, Instructional spending per pupil, and Teacher spending per pupil) between successful and unsuccessful schools. Tables 1 and 2 show line item spending on general education and special education students, respectively, for all successful schools (elementary and middle, including our case study schools). In a result that will be mirrored throughout this analysis, we find no significant differences in major spending categories. As highlighted in the literature, these aggregations might obscure important differences in disaggregated line item spending, so we turn our attention to disaggregated functional categories of spending hypothesized to be important based on case study results. Between 1998-99 to 2001-02, spending on general education students in the three major categories is not significant, with similarly insignificant results across years for: Principals; Assistant Principals; and Professional Development. Other Classroom Staff is the only category significantly different in three of four years, and spending is higher in successful schools. This functional category captures spending on lab assistants and media technicians, and is interesting as this difference in spending could result from unsuccessful schools' having fewer science labs or other facilities and equipment that require trained technicians (Herszenhorn, 2005). Curriculum Development and Attendance/Outreach are significantly different in two of the four years examined. Otherwise, all other categories are statistically significant in only one year or none.

Spending on all major categories for special education students is not significantly different, with similarly insignificant results across years for Assistant Principals, Textbooks, and Parental Involvement.

Principals and Summer School spending is significantly different in three of the four years examined, and in both cases is lower in successful schools. Leadership Supplies/Equipment, Attendance/Outreach, Library Resources, and Professional Development spending is significantly different in two of the four years. Ancillary Support Services for Computer Systems, After-school Programs and Other Classroom Staff line items for full-time special education students are significant in only one year.[15]

The expenditure reports also provide detail on grants received by each school, as well as teacher salary detail, as shown in Table 3. Grants that were hypothesized to be important are insignificantly different between successful and unsuccessful schools: Private Grants; Federal ELL; State Bilingual Education; and Title III/Technology. However, teacher variables yield more significant differences. The pupil-teacher ratio is significantly higher in successful schools, a somewhat surprising results. However, it is possible successful schools buy quality rather than quantity, and if salaries can be considered a measure of quality, then there is support for this hypothesis, as the teacher salary and benefits variables (on a per-teacher basis) are significantly higher for all teachers and for just full-time teachers in successful schools. If higher salaries buy higher quality teaching or teachers, the successful schools might have a better teaching force (as judged by low levels of test score gaps). From our previous case study results, we learned that principals had an unusual level of control over hiring decisions despite union and other district rules limiting that choice for many other school leaders. Interestingly, these detailed teacher compensation variables from payroll data (Table 3) yield more significant results than the more highly aggregated teacher spending data totals reported in the expenditure reports (Tables 1 and 2).

Besides the teacher variables and pupil-teacher ratio, only Other Classroom Staff spending is consistently different across years when examining the entire pool of successful schools – without regard to instructional level – against the entire pool of unsuccessful schools in the same district. With these few

[15] Note that data for Other Classroom Staff spending on FTSE students are available for only the two most recent years analyzed.

overarching trends in mind, we next turn our attention to differences by instructional level to see if our results change, and to see where our case study schools fit into the distribution of spending for all successful schools.

Both case study schools compared to all successful schools in the district. The left side of Table 4 shows that there are no statistically-significant differences in major spending categories between our case study middle schools and other successful middle schools in the same district in school year 2001-02 (similar results for school years 2000-01 back to 1998-99, with only significance levels shown from previous years).[16] Results for elementary schools are quite different, though. The right side of Table 4 shows that spending in our case study elementary schools is statistically-significant and higher than other successful elementary schools. However, when spending is broken down for GE and FTSE students, we see these overall results are driven by GE spending (Table 5). The case study elementary school has fewer GE students than the average for successful elementary schools and spends a statistically-significant higher amount in the three major spending categories (Total spending per pupil, Instructional spending per pupil, and Teacher spending per pupil). There are no statistically-significant differences at the middle school level.

Focusing on the middle columns of Table 1, there is significantly more (statistically) spent on full-time special education students, but not on general education students, as expected based on the full-time special education students enrollments for these schools. There are so few full-time special education students in our case study school that its spending on these students may have had little effect on overall spending; in deed we see no significant differences in spending on all students or on general education students, as expected.

[16] Complete results for previous years are available from the authors upon request.

Table 6 focuses on FTSE spending. The right side of Table 6 shows results for our case study elementary school compared to other successful elementary schools in the district. We find results opposite those for middle schools: our case study school has many more special education students than the average (101 compared to 38 on average for successful schools in 2002), while our case study middle school has fewer FTSE students than average. Results are thus expected to be opposite those for our middle schools, and they are. Our case study elementary school spends significantly more on GE students than the average for other successful elementary schools, but not significantly more on special education students. Despite our elementary case study school educating more FTSE students than the average successful elementary school, it spends less per FTSE pupil than average. And despite our middle school case study school educating fewer FTSE than average for successful middle schools, it spends more per FTSE pupil. It is possible that there are economies of scale at work in educating special education students, but only future research will further elucidate this point. It is important to note each case study school's place in the distribution of successful school spending, with the elementary case at the top of the distribution for GE and above average for FTSE and the middle school much closer to the mean for GE, but near the top for FTSE.

We continue our analysis by focusing on comparisons by instructional level and type of student, including our case study schools in the pool of successful schools.

All successful middle schools compared to all unsuccessful middle schools in the district. Table 7 and 8 show functional spending categories for GE and FTSE, respectively. As before, we find few significant differences in major spending categories (Total spending per pupil, Instructional spending per pupil, and Teacher spending per pupil). But as highlighted in the literature, these aggregations might obscure important differences in disaggregated line item spending.

Focusing on full-time special education student spending in middle schools (Table 8), all variables of interest are statistically-insignificant except Other Classroom Staff, Professional Development, Curriculum Development, and Leadership Supplies/Equipment, which are significantly different in only one year. We find more statistically-significant results for GE students (Table 7). Total spending and Total Classroom Instruction are significantly different in only the most recent year, and Curriculum Development, Principals, and Instructional Supplies/Equipment, which are significantly different in one year out of four. Attendance/Outreach is significantly different in two years, and Other Classroom Staff spending on general education students is significant in all years. Notably, there is a statistically-significant greater number of GE students in successful schools in 3 of 4 years. Successful schools are larger, on average, than unsuccessful schools. In addition, Table 9 shows that successful schools also have a higher pupil-teacher ratio (statistically-significant in 3 of 4 years). This could be because successful middle schools have more experienced or better-paid teachers who can manage larger classes.[17] Lending support to this hypothesis, the teacher salary and benefits variables (on a per-teacher basis) are significantly higher for all teachers and for just full-time teachers in successful schools.

Table 9 also shows that private grants are significantly different (higher) in two years as are Emergency Immigrant Education grants. Although one might expect Federal English Language Learner (ELL) and State Bilingual grants also to be significantly different based on results for Emergency Immigrant Education grants, neither is significantly different in any year.

In summary, Other Classroom Staff spending for all students and for general education students continues to be significantly higher over time for successful middle schools, with teacher salaries and benefits also showing statistically-significant differences between successful and unsuccessful schools, with successful schools spending more across time. A higher pupil-teacher ratio also appears to be a statistically-

[17] Previous case studies showed that successful schools had more experienced teachers, lower teacher turnover rates, and teachers who were directly chosen for the most part by their principals to be best address the needs of each school's student population.

significant feature of successful middle schools. Therefore, although successful middle schools seem to focus spending on human resources, that spending is not used to bring down pupil-teacher ratios, rather it might be used to "purchase" higher quality teachers. With these results in mind, we next focus on elementary schools.

All successful elementary schools compared to all unsuccessful elementary schools in the district. We show spending on GE and FTSE students in Tables 10 and 11, respectively, for all successful elementary schools and unsuccessful elementary schools. As before, we find no significant differences in major spending categories (despite the inclusion of our case study school, which is a high-spending outlier in our pool of successful schools). However, looking at disaggregated categories of spending, we find significantly less spent for Summer School in all four years on FTSE students and on GE students. Building Service/Maintenance is significantly higher in three years for spending on all students and on general education students, but only for one year for full-time special education students, despite its being significant in three of four years for our case study school. Ancillary Support Services for Computer Systems is significant and lower for full-time special education students in two out of four years, but not for GE students. After-school Programs is significant and higher for GE students in two of the most recent years analyzed. All other variables for both types of students are statistically insignificant. The Other Classroom Staff variable is unavailable for elementary schools as elementary schools in this district do not have labs or other programs that require lab or media assistants or other technicians.

Table 12 displays results for grants and teacher variables. Title III/Technology grants are significant and lower for successful schools in three of the four years analyzed, and only Other teacher salary and benefits variables (i.e., teacher compensation for overseeing after-school activities or student clubs) are significant and higher, but neither full-time teacher salary and benefits nor pupil-teacher ratios are significantly different. Again, as with successful middle schools, human resources seem to be the focus of

school spending, with an emphasis on after-school programs and teacher support (salaries and benefits) for these programs.

Comparing elementary school and middle school results. Middle schools and elementary schools provide different education services to students, and these differences are reflected in our results. Although the three major spending categories are insignificant for the most part for GE and FTSE students in both middle and elementary schools, important (statistically-significant) differences are seen in disaggregated functional spending categories. For elementary schools, a statistically-significant lower amount is spent on Summer School, Textbooks, and Library Resources for both types of students in successful schools. A statistically-significant and larger amount is spent on After-school Programs and Other teacher salaries and benefits (which support after-school programs) in successful schools. The Title III/Technology revenue stream is lower in successful elementary schools further highlighting the emphasis on human resources over equipment and instructional supplies.

For middle schools, Other Classroom Staff is significantly different (higher) across all years for both types of students, and Attendance/Outreach is primarily significant for general education students. Middle school differences -- unlike at the elementary level -- are insignificant for Textbooks, Library Resources, Summer School, and After-school Programs for GE students.

For special education student spending, Textbooks, Library Resources, Classroom Supplies/Equipment, Summer School, and Ancillary Support Services for Computer Systems are all insignificantly different between successful and unsuccessful middle schools, but not between elementary schools. A statistically-significant lower amount is spent on these items for FTSE in successful elementary schools. Otherwise results are similar for special education student spending in middle and in elementary schools. For general education students, Textbooks, Library Resources, Summer School, After-school Programs, Parental Involvement, and Leadership Supplies/Equipment are insignificant for middle schools but significant for

elementary schools. Except for After-school Programs, less is spent on these categories for GE in successful elementary schools.

In contrast to the statistically-insignificant results at the middle school level, Title III/Technology grants are significantly different (lower) for successful elementary schools, and Private grants are significant and higher in two years for middle schools, but not elementary schools. Teacher variables were more consistently significant across instructional levels, with All teacher salaries and benefits and Full-time teacher salaries and benefits significant and higher for middle schools and Other teacher salary and benefits significant and higher for elementary schools. A focus on human resources spending is a consistent thread in the story of successful middle and elementary schools.

Conclusions

As one might expect from the literature on whether money matters to student outcomes, aggregated measures of spending (major spending categories: Total spending per pupil, Instructional spending per pupil, and Teacher spending per pupil) do not turn out to be significantly different between our successful and unsuccessful schools, whether at the elementary or middle instructional levels. Again, as suggested by the literature, disaggregated levels of spending reported at the school level do reveal statistically-significant differences in successful schools' use of funds that are obscured by aggregated figures. Based on lessons drawn from case studies of three successful schools, we hypothesized higher spending in a number of areas including Leadership (specifically Principals and Assistant Principals), Professional Development, Parental Involvement, Classroom Instructional Supplies/Equipment, Leadership Supplies/Equipment, and Ancillary Support Services for Computer Systems, as well as several grant areas including Federal ELL, State Bilingual Education, Emergency Immigrant Education, and Private Grants.

We find that few of our hypotheses hold, depending on the instructional level and the type of student (FTSE and GE). However, we can draw other lessons from the analysis. At the elementary level, spending

on After-school Programs in the two most recent years is significant and higher in successful schools. Further, in three of the four years analyzed, spending on “Other Teacher” salary and benefits -- amounts paid to teachers "per session" such as stipends for being yearbook advisor or supervisor of an after-school program -- is significant and higher in successful elementary schools. These results are not similar for middle schools for either type of student. Of note, Summer/Evening School expenditures are significant and lower in successful elementary schools across all years and all student types, implying that reductions in test score gaps have less to do with remediation than factors in place during regular school hours and non-remedial after-school programs.

Although spending on computers and data systems does not appear to be significantly different in successful and unsuccessful elementary schools (Instructional Supplies/Equipment, Leadership Supplies/Equipment, and Ancillary Support for Computer Systems), the Title III/Technology revenue stream is significant and lower than in unsuccessful schools in three of four years, suggesting that successful schools either use their technology funding more efficiently than other schools or they are starting from a better position technologically than unsuccessful schools that are trying to catch up. Neither the expenditures nor revenues for technology were significantly different for successful and unsuccessful middle schools. This helps to define a thread strung through this analysis, specifically the emphasis in successful schools on people over things, where significantly more is spent on salaries and benefits than on instructional supplies, computers, textbooks, library resources, etc.

At the middle school level, Other Classroom Staff spending -- expenditures for personnel who provide direct services to students such as lab assistants and technicians -- is significant and higher than in unsuccessful schools. This difference in spending could result from unsuccessful schools’ having fewer science labs, as pointed out by community groups (Herszenhorn, 2005). In addition, full-time teacher salaries and benefits are statistically-significant and higher in successful middle schools than in

unsuccessful middle schools.[18] In addition, at the elementary level, After-school spending and Other teacher salary and benefits, which partly support school-based after-school programs, is higher and statistically-significant for successful schools.

One important lesson is that, in some ways, line-item expenditures might not accurately reflect the mechanisms identified as factors in reducing test score gaps. However, we find as a general trend that the more disaggregated the reported spending, the more likely we are to find significant results. Teacher compensation results are a good example: the aggregated amounts shown in the Teacher line of the expenditure reports was never significantly different between successful and unsuccessful schools, but when we looked at the detail beneath that line provided by the teacher payroll data (i.e., data on All teacher salary and benefits, just Full-time teachers, Full-time plus Prep Period compensation, Part-time teachers, and Other teacher salary and benefits), we found many statistically-significant differences. Disaggregation seems to be important to understanding what actually happens within schools.

Also, considering the significantly higher teacher salary variables in elementary and middle schools, as well as the significantly higher pupil-teacher ratios especially at the middle school level, it is possible that successful schools are buying higher quality teachers. These schools seem to choose quality over quantity, especially at the middle school level where the successful schools are larger and have higher pupil-teacher ratios.

It is important to note that successful schools, despite instructional level and despite type of student, spend significantly more (statistically) on human resources than on other sorts of resources such as textbooks, library books, or instructional supplies and equipment. This overarching lesson reflects that taken from the original case studies: successful schools emphasize their human resources, resulting in

[18] Also note that these salary differences are not likely to be due to more special education teachers -- who tend to receive higher salaries than other teachers -- working in successful schools; there is not a significantly higher number of full-time special education students on average in successful schools.

lower teacher turnover and teachers who are more satisfied with their school's leadership, which in turn leads to better-educated students and environments that allow for test score gaps to be eliminated.

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APPENDIX I

School-Based Expenditure Reports
Functional Categories
(2002)

TOTAL (SUM of I, II, III and IV)

I. DIRECT SERVICES (SUM of A, B, C, D, E, and F)
   A. CLASSROOM INSTRUCTION
      1. Teachers
      2. Educational Para-professionals
      3. Other Classroom Staff
      4. Text Books
      5. Librarians and Library Books
      6. Instructional Supplies and Equipment
      7. Professional Development
      8. Curriculum Development
      9. Contracted Instruction
      10. Summer/Evening School
   B. INSTRUCTIONAL SUPPORT SERVICES
      1. Counseling Services
      2. Attendance and Outreach
      3. Related Services
      4. Drug Prevent Programs
      5. Referral/Evaluation
      6. After School and Student Activities
      7. Parent Involvement
   C. LEADERSHIP/SUPERVISION/SUPPORT
      1. Principals
      2. Assistant Principals
      3. Supervisors
      4. Secretaries and School Aides
      5. Supplies, Materials, Equipment and Telephone
   D. ANCILLARY SUPPORT SERVICES
      1. Food Services
      2. Transportation
      3. School Safety
      4. Computer System Support
   E. BUILDING SERVICES
      1. Custodial Services
      2. Building Maintenance
      3. Leases
      4. Energy
   F. DISTRICT SUPPORT
      1. Unscheduled Sums/Carry

II. DISTRICT/SUPERINTEND COSTS (Sum of A and B)
   A. INSTRUCTIONAL SUPPORT and ADMIN
   B. OTHER DISTRICT and BORO COSTS
      1. Sabbaticals, Leaves and Termination Pay

2. Additions to Regular Salary
3. Projected Expenses

III. SYSTEMWIDE COSTS (Sum of A and B)
- A. CENTRAL INSTRUCTIONAL SUPPORT
- B. CENTRAL ADMINISTRATION
  1. Instruct Offices
  2. Operational Offices
  3. Central and Chancellor's Offices

IV. OTHER SYSTEMWIDE OBLIGATIONS
- A. OTHER SYSTEMWIDE OBLIGATIONS
  1. Debt Service
  2. Retiree Health/Welfare
  3. Special Commissioner for Investigations
  4. Projected Expenses