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MOVING TOWARD COMPARABILITY: ASSESSING PER STUDENT COSTS IN K-12

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ABSTRACT. The current classifications for public school costs are provided by the National Center for Educational Statistics. To improve comparability between school districts, we provided an alternative classification with fewer numbers of expenditure categories, distinctions between school-based and non-school based administration costs, and school levels. The new classification was then applied to five comparable urban school districts. We found (1) that teacher salaries per student are affected by school level disaggregation; (2) that separating administrative costs into school-based and nonschool- based provides for an observable cost relationship; and (3) that curriculum and instructional support per student differ by school level disaggregation. The alternative classification may assist auditors and investigators whose role is to assess the costs performance of urban school districts by providing comparable school level and cost type.

INTRODUCTION

Educational expenditures are an increasingly compelling presence in government finance. During the 2005-06 school year, total public expenditures for elementary and secondary schools in the United States reached $526.6 billion. Of these expenditures, about 86% ($451 billion) were current expenditures[1] (National Center for Education Studies [NCES], 2009). On a per student basis, annual

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education expenditures were $9,769, or about 38% higher than the Organisation for Economic Co-Operation & Development (OECD) average of $7,065 (NCES, 2009). Although dramatic increases in the cost of education have been cited as a recent occurrence (U.S. Bureau of the Census [Census], 2008), Hoxby (2004) traced the rise in costs from $4,800 in 1970 to $9,230 in 2000, after adjusting for inflation. The cost of financing public education is high, but the real issue is that the costs have risen for each of the last three decades.

Although discussion on education expenditures is typically reserved for federal and state levels, 44% ($231.2 billion) of the education expenses in the 2005-06 school year were incurred by local governments (Census, 2008). The overwhelming cost of public school financing poses a significant burden on local governments, whose expenditures on elementary-secondary education has increased over the last decade despite increased competition for other spending priorities. In school year 1992-93, about 34.5% of local government expenditures were on K-12 education, increasing to 35.6% in 2005-06 (Census, 2007). In addition to the cost factors, there are complicating policy factors, such as No Child Left Behind, that compel state and local governments to find a way of balancing tighter budgets. The current financial crisis faced by many state and local governments has forced cuts in public school expenditures, a problem further complicated as “[s]tate legislatures have focused on public education efficiency as a result of the increased mandated funding for other needs, specially Medicaid and prisons" (Clancy & Patton, 1996, p.272).

From these policy issues in public school financing, studies of public school efficiency and performance have emerged (Dodson & Garrett, 2004; Greene & Kang, 2004; Hanushek, 1997; William, 1996, 1998). It is our understanding that the main limitation of these studies is in their policy implications, including school consolidation (Chakraborty, Biswas, & Lewis, 2000; Dodson & Garrett, 2004), private and charter school competition (Dee, 1998; Greene & Kang, 2004), and adjustment in input factors (Anderson, Shughart, & Tollison, 1991). The critical assumptions of these studies are (1) the relationship between input factors such as instruction, supply, and administration and outputs/performance is essentially the same between the elementary and secondary schools; (2) school-based and non-school based administrative factors have the same impact

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on the outputs; and, (3) cost accounting methods across school districts in different states are comparable. If the first two assumptions are not correct, the results in the prior studies may mislead the reform efforts in public school administration in the sense that different policy alternatives are needed for different dimensions of the issue. The third assumption poses a limitation of external validity of those studies since the institutional and organizational characteristics of the school districts might be different. In such a case, any finding from one school district cannot be applied to districts in any other state. This presents a severe limitation when providing baseline performance criteria.

This study aimed to suggest an alternative costs classification, taking into account the assumptions of prior studies. We introduced distinctions between school-based and non-school based administration costs and between elementary and secondary schools to provide an identification of possible sources of inefficiency. After developing a classification system with few categories and sub-categories, we applied it to five school districts with similar characteristics (Atlanta, Boston, Mobile, Newark, and Nashville) to demonstrate comparability in use. To accomplish these tasks, the remainder of this paper is organized as follows. The next section integrates the current literature of public school efficiency and performance. Sections III and IV provide an alternative classification system of costs classification and its application to the five school districts for the period of 2003-2005, respectively. Finally, Section V concludes and points out the study limitations. Suggestions of further research are also provided.

SCHOOL EFFICIENCY, PERFORMANCE, AND COST ACCOUNTING

The studies estimating the cost of financing public school systems is largely precipitated by the introduction of, or attempts to introduce, major school finance reforms. For instance, in 1992, Kansas transferred major public school decisions (e.g. taxation and spending decisions) to the state (Johnston & Duncombe, 1998). In 1995, the Ohio Supreme Court ruled that the system of financing public education in Ohio was unconstitutional on the ground that it had not lived up to the promise of providing “adequate” public education (Ruggiero, 2001). The Court-dictated overhaul of Ohio’s public school system effectively mandated the determination of the

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base costs of providing adequate public education throughout the state. Five years prior to the Ohio case, the New Jersey Supreme Court declared the state's school financing system unconstitutional. The state government responded by passing the Quality Education Act, which increased state aid by almost 25 percent and phased-out general aid to wealthy school districts (Firestone & Goertz, 1996). It is reasonable to assume that most subsequent policy decisions of state governments to implement school finance reforms have been informed by cost and efficiency studies on their respective public school systems.

There are three major approaches in measuring cost or efficiency of providing public education. The most common approach is ratio analysis which examines the relationship of single inputs and single outputs. The primary weakness of this method is its lack of comparability. For instance, annual per-student expenditure (which is a common ratio indicator) is difficult to compare across school districts, especially ones that belong to different states because school districts vary in the socio-economic context. School districts with a higher percentage of students in need will require more resources (Ruggiero, 2001). The use of average costs has also been criticized. Cost averaging can hide real spending differences among schools and transfers money away from schools in poverty neighborhoods and towards those in more affluent parts of the district (Hill, 2006).

The second approach is regression analysis, which tries to explicitly estimate the relationship between inputs and outputs, and define the residuals corresponding to each observation as the inefficiency value of the decision-making units (e.g. district or school-level) (Mancebon & Bandres, 1999). The advantage of regression analysis over ratio analysis is that it can control for other variables (e.g. socio-economic variables) that influence the public school expenditures at the school or district level. Using regression analysis and its derivatives, several studies have applied the stochastic approach in estimating efficiency in the public school system. For instance, using a stochastic frontier approach (SFA), Dodson and Garrett (2004) found evidence for economies of scale in teacher salary expenses, supply costs, and total costs across Arkansas school districts. Also employing SFA, Dopuch and Gupta (1997) estimated that the Missouri school districts may have had as much as $394

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million of excess expenditures in their operations for the year 1990-91.

The third technique, data envelopment analysis (DEA), is non-parametric, which derives efficiency scores of a school or school district by solving a mathematical programming model in which a benchmarked school is used as the comparative. The difference between regression models and the mathematical programming models like DEA is that the former specify an appropriate functional form that links the input and output of the education production process while the latter assumes that the education production frontier has a partially implicit character (Mancebon & Bandres, 1999). The DEA method earns more popularity in efficiency studies of the education sector because of the difficulty of specifying functional forms (Rubin, 2004). Using DEA, Ruggiero (2001) estimated that Ohio public schools were only 84 percent efficient, indicating over-spending in excess of $600 per student. Employing the same DEA approach, Banker et al. (2004) also found significant allocative inefficiencies in the Texas public school system using a panel of 555 public schools.

The critical question of the school efficiency studies is whether "school districts become too large and exceed their point of efficiency" (William, 1998, p.514). This is a question of the relationship between resources expended and outputs/performance scores (Coleman et al., 1966), which reflects an interest in top-down accountability (Hanushek, 1997; Rubin, 2004). To answer the question, a wide range of input factor measures have been used, including per-student instructional expenditures (Dee, 1998; Sebold & Dato, 1981), teacher salaries and experience with various operationalizations such as student demographic and achievement data (Clancy & Patton, 1996; Cybulski et al., 2005; Dodson & Garrett, 2004), operating expenditures (Banker, Janakiraman, & Natarajan, 2004; Chakraborty, Biswas, & Lewis 2000), total expenditures (Dopuch & Gupta, 1997), and quantities of administrators, teachers, professional support staff, and teaching aides (Grosskopf et al., 1999). In his review of 377 educational performance studies, Hanushek (1997) broke down measures of resources devoted to schools into three categories of the real resources of classroom (teacher education, teacher experience, and teacher-pupil ratios), financial aggregates of resources (expenditures per student and

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teacher salary), and measures of other resources in schools (specific teacher characteristics, administrative inputs, and facilities). Of the studies, 163 examined the relationship between per-student expenditures and student performance, with 27 percent finding significantly positive effects of expenditures, and seven percent of the studies reporting significantly negative effects. There is variation in the results depending on levels of aggregation. For example, at the school level, only 17 percent of the 83 studies found positive significant evidence of expenditures, while at the district level, 28 percent of 43 studies reported positive significant results. Hanushek's (1997) review is an indication of the complexity and low consistency of studying, reporting, and communicating the performance and efficiency of public schools and school districts. "The selection of input measures is less consistent with numerous characteristics being studied as determinants of school or student performance" (Rubin, 2004, p.150). Part of the problem is due to "the lack of consensus regarding the education production function and associated difficulties with measurement" (Rubin, 2004, p.161).

Mensah, Schoderbek, and Werner (2009) approached the information needed in cost-effective management by identify factors controllable by school district superintendents to institute reforms to improve their operations and achieve greater cost efficiency and effectiveness. Mensah, Schoderbek, and Werner (2009) used a single state's, New Jersey's, school data to empirically identify cost-effective tools providing a potential yield of valuable insight into the trade-offs made by the management of public-sector institutions. Their results indicate that for New Jersey, school level variables of elementary, middle, and high schools are statistically significant control factors in their test score equations. They ended the study by stating that the results may not be generalizable to other states- the measures they use may be state specific.

While providing valuable knowledge on parts of educational efficiency and performance, these studies are limited in informing institutional and organizational characteristics of public school production such as school-based and nonschool-based expenditures. Moreover, they are limited in providing information on relative contribution of different functions/objects of expenditures to outputs/outcomes. Such issues as the relative efficiency of school-based administration versus nonschool-based administration in

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districts, which is further confounded by varying sizes and/or administrative functions at the elementary versus secondary school level, however are not addressed in the current literature. This lacuna is at odds with the reform efforts where the use of administrative tools, such as cost accounting and performance audits, could provide school officials identifiable and controllable factors to institute reforms that improve operations and achieve greater cost efficiency and effectiveness.

So what drives the confounding prior research results? It is conceivable that the limitation of the previous studies is based on the composition of the available data which conforms to the cost accounting classifications provided by the NCES as observed in Table 1. Although the classification recommended by the NCES is quite comprehensive and well-organized, there are a couple of important limitations in its application to practice and research. First, the classification does not distinguish between levels of schools. The aggregated, district level data produced by the classification did not allow investigators to make a meaningful distinction in expenditure characteristics between elementary and secondary schools.

TABLE 1
NCES Recommended Classification of School Expenditures

By Functions	By Objects
- Instruction - Support Services – Students (1), Instruction (8), General Administration (2), School Administration (2), Central Services (8), Operational and Maintenance of Plant (8), and Student Transportation (4) - Operation of Non-instructional Services (3) - Facilities Acquisition and Construction (8) - Debt Service	- Personal Services (20 sub-categories) - Personal Services-Employee Benefits (39) - Purchased Professional and Technical Services (7) - Purchased Property Services (11) - Other Purchased Services (22) - Supplies (12) - Property (11) - Debt Service and Miscellaneous (8) - Other Items (8)

Notes: ( ) indicates number of sub-categories.
Source: National Center for Education Studies (2003).

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As shown in Mensah, Schoderbek, and Werner's (2009) results, school levels can affect the efficiency outcomes. Barrett (2008) showed that in retailing, using this level of detail for the actual cost assignments, the costing model itself is kept relatively small and efficient. Second, except for the instructional expenditures, the classification is not clear about payment to individuals for services, particularly nonschool-based administration. This can be observed in William (1998) who pointed to efficiency as a function of school district size ignoring the differential effects that nonschool-based services have on overall school district size. Third, it is difficult, if not impossible, to make meaningful comparisons across school districts, regardless of whether in or out of state, since the categories require expenditures to be broken down into as many as 138 subcategories. It would be a daunting task to figure out exactly what categories a specific expenditure item belongs to especially when the expenditure is nonschool-based administration for each district. This aspect is noted by Dodson and Garrett (2004) and Mensah, Schoderbek, and Werner (2009) where the factors for efficiency and effectiveness are questioned given the large number of possible interaction terms that could be conceived of, but do not seem practical in application. This is a similar finding in activity-based costing; its precise measurement of costs ignores the constraints of resources, an important aspect of school expenditures.

In the following sections, building upon the prior literature and the NCES's recommended classification of public school expenditures, a classification system is derived that could lessen the limitations of the NCES classification to assist investigators and researchers. The new classification system is applied to the five comparable public school systems in this study.

A NEW EXPENDITURE CLASSIFICATION

The classification of school system expenditures into categories requires a balance between making distinctions that illuminate spending patterns and provide a basis for comparison with other districts on the one hand, and ensuring that the classification is not at such a micro level of detail that comparison between districts is impractical on the other. Our chosen method of classification is based on the literature that addresses school expenditures and the NCES.

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To begin, we divide total expenditures by a school district into two types: payments to individuals for services, and other costs. This isolates the human capital service provision toward school districts, providing a direct link to measuring efficient and effective management of human capital in an analysis. Payments to individuals for services are categorized by both school-based and nonschool-based human capital costs:

- Teachers' salaries;
- Nonschool-based administrative salaries (includes all administrative staff not located in schools);
- School-based administrative salaries (includes school principals and assistant principals, magnet coordinators and department chairs);
- Benefits;
- Other non-salary compensation (includes stipends and bonuses earned by salaried staff);
- Payments to paraprofessionals (includes all individuals who work under the supervision of a teacher or another professional staff member);
- Payments for non-educational support (includes janitors, secretaries, bus drivers, mechanics, and all support staff that do not directly deal with education or instructional support);
- Professional, non-administrative salaries (includes payments to all professionals that have a market outside the school system for their profession); and,
- Payments for curriculum and instructional support (includes librarians, coaches, and any staff involved with the instruction of students but not in a typical classroom setting).

Payments for other costs are categorized by purchased goods and services, maintenance and utilities, and travel. This places the non-human capital costs associated with school districts into a separate category.

Next, we divide expenditures between school-based and nonschool-based expenditures. The metric used is an allocation metric in which each individual payment category is identified as

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either direct or indirect expenditure to a school or a direct or indirect expenditure that was nonschool-based. We have not included expenditures on capital or nutrition in the classification, as these are highly variable "lumpy" expenditures that make comparative analysis difficult between districts.

Finally, all expenditures are calculated on a per-student basis to aid with the comparison to other school districts and address economies of scale. Appendix A provides a detailed demonstration of how Atlanta Public Schools expenditures are classified according to this classification.

Expenditures of Atlanta Public Schools

Using the new classification system, Appendix B provides the break-down of Atlanta Public Schools expenditures for fiscal years 2003, 2004, and 2005 respectively, where "fiscal year 2003" corresponds to "school year 2003-04" and so on. Expenditures are broken down into elementary, middle, and high school, as well as nonschool (nonschool is defined as spending outside of the school). The last column of each table gives an estimate of aggregate expenditures per student, where aggregated expenditures include both school-based and nonschool-based expenditures. For Atlanta Public Schools the 2003 estimated cost per student is $13,510, for 2004 it is $12,550, and for 2005 it is $11,881.

Before turning to the comparative analysis, we considered some aspects of Atlanta Public Schools' expenditures that struck us as worthy of further investigation. Overall and consistently over this time period, we found that the major contributors to per-student costs in our analysis are teacher salaries, benefits, and purchased goods which are common fixed costs associated with public school districts.

Overall, per student costs have decreased by 7.1 percent from 2003 to 2004, and by an additional 8.3 percent from 2004 to 2005. This is significant given the decline in the total number of students enrolled in 2005 from 2003. Given the presence of fixed costs of service delivery and the prior literature we would have expected declines in student population to cause per student expenditures to rise, at least in the short-run. Note also that our data had not been adjusted for inflation, another factor that would have led us to expect per student costs to rise.

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Our second main finding, now turning to the composition of expenditures, is that school-based expenditures are roughly 65 percent of total system expenditures during the years under study: 65.2 percent in 2003, 63.7 percent in 2004, and 66.5 percent in 2005. The figure of 65 percent has been applied as a target in some states where concerns have been raised that too large a proportion of expenditures were nonschool-based (Eggers et al., 2005; Embry 2005). By this measure, Atlanta Public Schools would be said to be meeting the appropriate targets.

The third finding involves the administrative costs per student, which does present some matter of concern. When separating school and nonschool-based administration we found that the costs of nonschool-based administration have held approximately constant at $420 per student in 2003, $412 in 2004, and $414 in 2005. This constant cost is in contrast to school-based administration which has declined over the period of study from $856 per student in 2003, to $696 in 2004, and finally to $585 in 2005. Combining school-based and nonschool-based administration, in each of the three years under study, expenditures per student on administration were about $1,000. We cannot say at this point, without comparison to other districts, whether such a level is unreasonable, but at least it suggests there could be some value in investigating why per student administrative costs are so high overall. There could also be value in investigating why nonschool-based administrative costs have not followed the trend of school-based administrative costs.

Details regarding the size of expenditures for Atlanta Public Schools are provided in Table 2, which lists the ratio of each category's expenditure as it relates to total expenditures per year. In the study period, the percent of school-based teacher salary has increased by more than 9 percentage points, while the percent of non-salary compensation and nonschool-based teacher salaries have decreased significantly.

As described above, the percent of school-based administrative expenditures decreased from 6.4 to 5.1 percent of costs. On the other hand, the percent of nonschool-based administrative costs has increased from 3.2 to 3.6 percent of costs over the 3 year period.

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TABLE 2
Expenditures of Atlanta Public Schools

	2003		2004		2005	
	School	Non-School	School	Non-School	School	Non-School
Teacher salary	27.2%	2.6%	32.9%	2.8%	36.5%	1.2%
Non-Salary Compensation	2.4%	1.9%	1.6%	2.0%	1.3%	1.6%
Paraprofessionals	2.2%	0.0%	2.4%	0.1%	2.6%	0.2%
Non-administrative Professionals	0.6%	0.7%	0.7%	0.9%	0.8%	1.2%
School-Based Administration	6.4%	0.0%	5.7%	0.0%	5.1%	0.0%
Nonschool-Based Administration	0.0%	3.2%	0.0%	3.4%	0.0%	3.6%
Curriculum & Instructional Support	2.0%	0.0%	2.2%	0.0%	2.3%	0.0%
Non-education Support	2.2%	3.9%	2.6%	4.1%	2.4%	4.3%
Benefits	9.4%	5.1%	9.1%	8.3%	8.8%	5.3%
Purchased Goods	9.4%	15.3%	6.6%	8.6%	4.4%	10.8%
Maintenance & Utilities	1.7%	1.4%	1.8%	2.5%	1.8%	2.7%
Travel	0.2%	0.3%	0.2%	0.2%	0.1%	0.3%
Other	0.1%	1.9%	0.0%	1.4%	0.0%	2.5%

Note: All data were compiled by the authors from the data provided by the school districts.

EXPENDITURES AT FIVE COMPARABLE SCHOOL DISTRICTS

The ability to compare school expenditures across districts has been a downfall in the NCES's classification of education cost accounting, leading to issues when assessing performance audits. After developing and demonstrating a new classification for Atlanta Public Schools in the previous section, there is some benefit in

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demonstrating the use of the proposed classification across school districts. To do so, we selected a sample of school districts with which to compare Atlanta Public Schools constructed on the following criteria: district size, student-teacher ratio, percent of students that are economically disadvantaged, and the district's racial composition following the criteria provided in Murray, Evans and Schwab (1998). Using an equal weight based methodology that gives equal weights to each criterion; we allow all districts to be retained within the possible comparison set. For racial composition we performed two separate calculations. One is based solely on the representation of minority groups within the district while the other includes a score for the representation of African American students specifically. For each of the above criterion, the comparative districts' values were subtracted from those of Atlanta. Districts were then ranked according to the similarity of the district's characteristics to those of Atlanta. For each ranking, 1 is equivalent to Atlanta, and all factors are weighted equally. These factors do not include measures of either student performance or per pupil expenditures, which are intentionally excluded. Scores on standardized tests were also omitted. The validity of standardized tests has become a contentious and debatable metric, and previous research indicates no direct relationship between expenditures and student test scores. Of the districts meeting the comparison criteria, four (Boston, Mobile, Nashville, and Newark) were able to provide the necessary data in the short timeline available for the study.

Some caveats are in order before moving to analyze the expenditures in the school districts. First, for many types of expenditures, the accountants make a judgment call as to how to classify the expenditure. School systems are complex organizations and there are bound to be some instances where expenditures might be classified one way but placed under a different classification at a different time. These difficulties arise, for example, in distinguishing between what counts as salary or non-salary compensation, or by whether individuals are professionals, paraprofessionals, or offering support for curriculum and instruction.

Second, for each of the school districts studied there are occasionally variations in the amount spent in certain categories that appear unusually large from year to year. Here are some examples:

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- In Atlanta, purchased goods and services fell from over $178 million in 2003 to just under $111 million in 2004 and under $103 million in 2005.
- In Newark, non-administration professionals' spending went from about $75 million in 2003 down to about $50 million in 2004 and back up over $75 million again in 2005.
- In Boston, curriculum and instructional support rose from around $42 million in 2003 to about $49 million in 2004, but then fell to around $27 million in 2005.
- In Nashville, other costs varied from $9 million in 2003 to over $141 million in 2005.

To assess and compare expenditures across districts, it was necessary to look at expenditure trends over a longer period of time than that for which we had data. This study is aware of making too much of particular categories of spending when there is a chance that some types of expenditure are being classified in varying ways across districts, and even within a district from year to year.

Third, each school district is reliant upon different revenue sources. These sources may change the expenditure policies of the district. For example, Atlanta has relied upon the Special Purpose Local Option Sales Tax (SPLOST) while no other district in this study used this form of revenue. Another example of this can be seen with grants. Compared to Atlanta, Boston receives a larger amount of their revenue from grants.

Using the New Classification to Measure and Compare Costs

To begin the comparison, we offered the traditional cost per student in Table 3 as found in the prior literature aggregating all non-capital and non-nutrition costs. Keeping in mind the limited time series available, from 2003 to 2005, we observed total costs per student had fallen in Atlanta and Boston, while risen in Mobile, Nashville, and Newark. Worth noting in Atlanta's figures is that 2003 had an anomalously high level of purchased goods and services. Per-student costs in Atlanta on purchased goods and services fell from $3,288 in 2003 to $1,876 in 2004 and $1,762 in 2005. If we exclude purchased goods and services from total costs, per-student costs in Atlanta were lower in 2003 than in 2004 or 2005.

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TABLE 3
Total Costs per Student, Excluding Capital and Nutrition

School District	2003	2004	2005
Atlanta	$13,290	$12,159	$11,596
Boston	$12,600	$13,388	$11,443
Mobile	N/A	$7,620	$9,580
Nashville	$7,289	$8,579	$9,969
Newark	$15,700	$16,610	$17,17

Notes: All data were compiled by the authors from the data provided by the school districts.

Teacher Salaries

Moving beyond the costs offered in Table 3, the study explored categorical costs based on our classifications. In general, teacher compensation in Atlanta is lower than Boston and Newark, although greater than in Mobile and Nashville. When averaging teacher salaries over the study period from 2003 through 2005, salary expenditures averaged $4,220 per student in Atlanta, $5,016 per student in Boston, $2,615 in Mobile, $3,269 in Nashville, and $5,153 per student in Newark. To explain these differences, we looked at three important aspects of compensation; retirement benefits, cost of living factors, and education levels. Looking at retirement benefits we see that one cause may be Social Security participation. For example, while Mobile, Nashville, and Newark have chosen to participate in the Social Security system, Atlanta teachers did not. Alternatively, Boston teachers participate in the Social Security system if their date of hire is after 1986. Using the 2005 Social Security contribution, employees are required to contribute 6.2 percent of taxable earnings to the Social Security system. This contribution is applied to earnings up to a maximum of $90,000. Therefore, it would be reasonable to assume that teachers' salaries in Atlanta should be higher than teachers' salaries in the other cities to adjust for the lack of federal retirement benefits that non-Atlanta teachers will be receiving. To provide an illustration of the difference, in 2005 the maximum benefit that an individual could receive from the Social Security system was $23,268 annually. A teacher in Atlanta would not be eligible for this benefit.

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How closely do average teacher salaries mirror the cost of living in these cities? In this respect there is some evidence that compensation is higher, relative to the cost of living in Atlanta than in the other cities. Based on recent cost-of-living comparisons (New York Times, 2006):

- The cost of living in Boston is 26.6 percent higher than in Atlanta, but teacher salary plus non-salary compensation per student is only 16.1% higher in Boston than in Atlanta;
- The cost of living in Mobile is 13.2 percent lower than in Atlanta, but teacher salary plus non-salary compensation per student is 40.4 percent lower in Mobile than in Atlanta;
- The cost of living in Newark is 17.5 percent higher than in Atlanta, but teacher salary plus non-salary compensation per student is only 12.7 percent higher in Newark than in Atlanta; and
- The cost of living in Nashville is 10.2 percent lower than Atlanta's, but teacher salary plus non-salary compensation per student is 20 percent lower in Nashville than in Atlanta.

The tables in Appendix C provide figures for 2005 for different levels of teacher certification, with the average salary at each grade and the salary range. In general, Boston teachers are more likely to have an advanced degree. In Boston, 83 percent of elementary, 79 percent of middle, and 82 percent of high school teachers have a Master's degree or above, while for Mobile the corresponding figures are 51 percent of elementary, 51 percent of middle, and 45 percent of high school teachers. For Atlanta, the corresponding figures are 55 percent of elementary, 51 percent of middle, and 63 percent of high school teachers with a Master's degree or above. Unsurprisingly, when the data were evaluated, teachers' salaries appeared to be affected by retirement benefits, location costs of living, and education levels of the teacher. That said, Atlanta appeared to have a higher teacher salary plus non-salary composition than did the other four districts when retirement benefits, location costs of living, and education levels of the teacher were taken into account.

To offer a distinction based on school levels, we obtained data on salary scales from Atlanta, Boston, and Mobile by school level-elementary, middle, and high school. Unfortunately, neither Nashville nor Newark provided data broken down by school level. Table 4 offers total teacher salaries for 2005[2] which are composed of both school-

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based and nonschool-based salaries, the most common measure in the extant literature. Using Table 4 and the districts for which we have data at the school level, we can assess the impact on teacher salaries of school-based and nonschool-based classifications. Table 4, the aggregated salaries, when compared to Table 5, salaries differentiated by school levels, shows that Atlanta has teacher nonschool-based salaries at $136 per student, Boston at $429 per student, and Mobile at $44 per student.

TABLE 4
Teacher Total Salaries in Thousands of Dollars in 2005

School District	Total Students	Total Teacher Salaries	Per Student
Atlanta	49,924	217,826	4.363
Boston	57,954	285,041	4.920
Mobile	64,747	174,708	2.700
Nashville	70,000	233,410	3.334
Newark	42,217	226,035	5.350

Notes: All data were compiled by the authors' from the data provided by the school districts.

TABLE 5
Teacher School-Based Salaries in Thousands of Dollars in 2005

School District	Total Students	Elementary	Middle	High	Per Student
Atlanta	49,924	122,184	40,548	48,321	4.227
Boston	57,954	127,415	49,101	83,775	4.491
Mobile	64,747	89,326	34,612	48,031	2.656

Notes: All data were compiled by the authors' from the data provided by the school districts.

Thus, nonschool-based salaries are not equally applied to these school districts. Therefore, without school level data, salaries are over stated in each district; however the largest overstatement of salaries is with the Boston school district. This outcome implies that

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school level data on salaries provide an important metric to assist practitioners and researchers in removing nonschool-based salaries, which overstate school salaries for teachers.

Administrative Costs

Disaggregating school-based and nonschool-based administrative expenditures, we began by comparing the nonschool-based administrative costs across districts. Using the same metric, per student costs as found in Tables 3 through 5, we show nonschool-based administrative costs per student in Table 6 for 2005. Amongst the districts there is a wide range of nonschool-based administrative costs, with Atlanta's nonschool-based administrative costs as the highest costs per student, and Newark's at about one-half that cost per student when compared to Atlanta's. This disaggregation would provide both Atlanta and Newark the opportunity to look at both effectiveness and efficiency regarding these costs. That being said, we also noted that nonschool-based administrative costs are similar for Boston, Mobile, and Nashville at about $10 per student. The nonschool-based administrative costs are in aggregate form since they are not associated with a specific school level, a similar outcome found with firms in senior management overhead costs.

Regarding school-based administrative costs, Table 7 offers a breakdown by school level for the three districts that reported non-aggregated, school-based administrative costs. Atlanta's and Boston's school-based administrative costs are similar while Mobile's

TABLE 6
Nonschool-based Administrative Costs in Thousands of Dollars in 2005

School District	Total Students	Administrative Costs	Per Student
Atlanta	49,924	20,667	0.414
Boston	57,954	7,147	0.123
Mobile	64,747	6,497	0.100
Nashville	70,000	4,204	0.060
Newark	42,217	9,046	0.214

Notes: All data were by the authors from the data provided by the school districts.

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TABLE 7
School-Based Administrative Costs in Thousands of Dollars in 2005

School District	Total Students	Elementary	Middle	High	Per Student
Atlanta	49,924	13,819	5,885	9,484	0.585
Boston	57,954	14,405	6,816	12,449	0.581
Mobile	64,747	6,485	3,546	4,125	0.219

Notes: All data were compiled by the authors from the data provided by the school districts.

are less than one-half either Atlanta's or Boston's per student costs. When Tables 6 and 7 are combined, the most common measure in the extant literature for administrative costs, one would assume that school-based and nonschool-based administrative costs are distributed equally across school districts. This assumption underlying the aggregate does not allow for school level differences in administrative costs or the differences underlying school-based and nonschool-based administrative costs.

Curriculum and Instructional Support

Table 8 provides our last category of costs that are broken down by school level. In Table 8, aggregate curriculum & instructional support costs are shown for each school district for 2005. The costs

TABLE 8
Curriculum & Instructional Support Costs in Thousands of Dollars in 2005

School District	Total Students	Curriculum & Instructional Support Costs	Per Student
Atlanta	49,924	13,368	0.268
Boston	57,954	27,317	0.471
Mobile	64,747	1,725	0.027
Nashville	70,000	16,821	0.240
Newark	42,217	36,168	0.857

Notes: All data were compiled by the authors from the data provided by the school districts.

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per student varied widely among the school districts with Newark having the highest per student expenditure and Mobile the lowest expenditure. Table 9 follows the orientation of the prior tables, breaking this cost down by school level. As found in the prior tables, breaking this cost down by school level, for at least Boston, substantially changes per student costs in the disaggregated data.

TABLE 9
Curriculum and Instructional Support Costs in Thousands of Dollars in 2005

School District	Total Students	Elementary	Middle	High	Per Student
Atlanta	49,924	6,598	3,207	3,502	0.267
Boston	57,954	1,402	1,807	6,160	0.162
Mobile	64,747	135	53	1,537	0.027

Notes: All data were compiled by the authors from the data provided by the school districts.

CONCLUSION

In this paper, an alternative classification of public school costs was developed and applied that can provide information on school-based and nonschool-based expenditures, costs paid to individuals and other costs, and costs for elementary, middle, and high schools. Using Atlanta Public Schools as our base, our classification has a much smaller number of categories and sub-categories of expenditures than that recommended by the NCES and provides a systematic basis for comparisons across school districts. Given the comparison the following conclusions can be noted:

- Teacher salaries per student are affected by school level disaggregation.
- Administrative costs for school-based and nonschool-based expenditures provide for an observable cost relationship.
- Curriculum and Instructional Support per student differ by school level.

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Prior criticisms of the NCES classification was the complexity of the categories and the limits the classification posed to compare districts. In this study an attempt was made to use a cost accounting focus to provide a new classification system that provides investigators, performance auditors, and researchers the opportunity for comparative analysis within a framework of consistent classifications of expenditures.

The main limitation of this study is in its data coverage. Inclusion of more comparable school districts in this program of study could yield more insights into the expenditure patterns of public school districts. Extending the number of years of data would assist in making comprehensive and time invariant conclusions within the analysis.

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NOTES

1. Current expenditures are understood as noncapital, typically recurrent expenditures necessary for the operation of a business. This includes expenses such as salaries, benefits, supplies, etc.
2. Choice of year has no effect on the described outcomes. Data for all years are available from authors upon request.

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APPENDICIES

APPENDIX A
Classification of Atlanta Public Schools Expenditures

Categories	Sub-categories	
Teacher salaries	- Teachers - Substitutes for Certified Employee Teachers - Extended-day teachers	- Pre-K teachers - Art, Music and PE teachers
Non-salary Compensation	- Bonus pay - Extended year - Overtime pay at premium - Part-time pay - Performance pay - Professional development stipends	- Recreational pay - Stipend pay - Substitutes for non-certified employees - Summer-school pay for paraprofessionals - Summer-school pay for teachers

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APPENDIX A (Continued)

Categories	Sub-categories	
Para-professionals	Aides and paraprofessionals	
Non-administrative Professionals	- Legal personnel - Technology specialists - Research personnel - School psychologists - Physical/Occupational/ Mobility therapists	- Diagnostic audiologists - Accountants - School nurses and special education nurses - School social workers
School-based Administration	- Principals - Assistant principals	All other management/ administrative personnel assigned to school
Nonschool-based administration	- School board member salaries - Superintendents - Deputy, associate, and assistant area superintendents	All other management/ administrative personnel not specifically assigned to schools
Curriculum & Instructional Support	Librarians and Media specialists	- Interpreters - School counselors
Non-educational support	- Bus drivers - Maintenance and other transportation personnel	- Custodial personnel - Clerical staff
Benefits	- Car allowances - Employee benefits - City pension - Annual leave retirement - Teachers' retirement system FICA	- Dental insurance - Life insurance - State health insurance - Workman's compensation
Purchased Goods and Services	- Books, textbooks and periodicals - Computer software - Contracted services - Expendable equipment - Depreciation	- Purchases or leases of buses, computers, and other equipment - Purchased professional and technical services - Rentals of equipment and vehicles - Supplies

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APPENDIX A (Continued)

Categories	Sub-categories	
Maintenance and Utilities	- All utilities - Repair and maintenance services	Water and sewer services
Travel	Travel by School Board members	Airfares, food, Lodging, Mileage, Registration and Miscellaneous
Capital	Land acquisition and development	Building acquisition, construction and improvements
School Nutrition	- Purchased food and acquisitions from USDA - School nutrition programs	- Small kitchen equipment - Warehouse

Notes: All data were compiled by the authors from the data provided by the school districts.

APPENDIX B1
Atlanta 2003 Estimated Cost per Student (in $ thousands): 50,991 Students

	Elementary	Middle	High	Total School	Non-School	Per Student
Teacher salaries	$114,925	$36,231	$33,219	$184,375	$17,481	$3.959
Non-salary Compensation	7,576	3,571	5,305	16,452	12,678	0.571
Para-professional	11,485	1,899	1,242	14,626	274	0.292
Non-administrative Professionals	2,470	818	630	3,918	5,013	0.175
School-based Administration	20,044	8,321	15,300	43,665	0	0.856
Nonschool-based Administration				0	21,397	0.420
Curriculum & Instructional support	7,269	3,097	3,176	13,542	19	0.266
Non-education support	9,079	3,198	2,831	15,108	26,180	0.810
Benefits	37,875	12,665	12,849	63,389	34,855	1.927

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APPENDIX B1 (Continued)

	Elementary	Middle	High	Total School	Non-School	Per Student
Purchased goods	36,437	19,130	8,332	63,899	103,767	3.288
Maintenance & Utilities	6,185	2,342	2,697	11,224	9,632	0.409
Travel	846	113	364	1,323	1,792	0.061
Other	107	70	256	433	12,611	0.256
Total	$254,298	$91,455	$86,201	$431,954	$245,699	$13.290

Notes: See Appendix A for category definitions. Totals do not always precisely add due to rounding. All data were compiled by the authors from the data provided by the school districts.

APPENDIX B2
Atlanta 2004 Estimated Cost per Student (in $1,000): 49,580 Students

	Elementary	Middle	High	Total School	Non-School	Per Student
Teacher salaries	$120,786	$38,968	$38,691	$198,445	$16,671	$4.339
Non-salary Compensation	5,128	1,878	2,584	9,590	11,820	0.432
Para-professional	11,165	1,941	1,119	14,225	635	0.300
Non-administrative Professionals	2,962	866	614	4,442	5,543	0.201
School-based Administration	17,088	6,712	10,693	34,493	0	0.696
Nonschool-based Administration				0	20,437	0.412
Curriculum & Instructional support	7,164	2,963	3,371	13,498	(24)	0.272
Non-education support	9,191	3,243	2,943	15,377	24,876	0.812
Benefits	32,589	11,649	10,794	55,032	50,043	2.119
Purchased goods	16,351	7,023	16,423	39,797	51,744	1.846
Maintenance & Utilities	5,971	2,334	2,332	10,637	14,981	0.517

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APPENDIX B2 (Continued)

	Elementary	Middle	High	Total School	Non-School	Per Student
Travel	524	122	269	915	1,196	0.043
Other	36	31	31	98	8,349	0.170
Total	$228,955	$77,730	$89,864	$396,549	$206,271	$12.159

Notes: See Appendix A for category definitions. Totals do not always precisely add due to rounding. All data were compiled by the authors from the data provided by the school districts.

APPENDIX B3
Atlanta 2005 Estimated Cost per Student (in $1,000): 49,924 Students

	Elemen-tary	Middle	High	Total School	Non-School	Per Student
Teacher salaries	$122,184	$40,548	$48,321	$211,053	$6,773	$4.363
Non-salary Compensation	3,358	1,588	2,537	7,483	9,335	0.337
Para-professional	11,427	2,538	1,225	15,190	1,060	0.325
Non-administra-tive professionals	3,200	921	669	4,790	6,875	0.234
School-based Administration	13,819	5,885	9,484	29,188	0	0.585
Central Administration					20,667	0.414
Curriculum & Instructional support	6,598	3,207	3,502	13,307	61	0.268
Non-education support	8,148	2,822	2,994	13,964	25,061	0.782
Benefits	29,745	10,526	10,491	50,762	30,784	1.633
Purchased goods	10,226	5,939	9,530	25,695	62,268	1.762
Maintenance & Utilities	5,975	2,427	2,258	10,660	15,587	0.526
Travel	438	75	184	697	1,558	0.045
Other	27	20	65	112	14,656	0.296
Total	$215,145	$76,496	$91,260	$382,901	$194,685	$11.569

Notes: See Appendix A for category definitions. Totals do not always precisely add due to rounding. All data were compiled by the authors from the data provided by the school districts.

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APPENDIX C1
Teacher Salaries in Atlanta Public Schools

	Average	Range	Count
Elementary School			
Bachelor's Degree	47,768	31,167-73,408	933
Master's Degree	56,806	40,157-85,859	905
Specialist Degree	65,982	39,462-85,859	198
Doctorate Degree	77,137	62,486-94,445	40
Middle School			
Bachelor's Degree	45,987	32,458-66,260	382
Master's Degree	55,896	40,157-94,445*	285
Specialist Degree	65,629	45,889-83,924	82
Doctorate Degree	77,542	53,450-94,445	23
High School			
Bachelor's Degree	48,522	33,222-73,189	283
Master's Degree	55,860	31,720-73,242	364
Specialist Degree	66,675	45,911-78,425	105
Doctorate Degree	71,294	46,947-86,267	23

Notes: * A single individual has a salary of $100,154. Data were derived from pay rate data and does not indicate posted range on APS website. These data are the current pay rates for FY 2005 teachers. All data were compiled by the authors' from the data provided by the school districts.

APPENDIX C2
Teacher Salaries in Boston Public Schools

	Average	Range	Count
Elementary School			
Bachelor's Degree	60,516	40,707-65,310	291
Bachelor's Degree + 15 credit hours	63,506	42,110-67,109	335
Master's Degree	62,963	43,508-68,915	523
Master's Degree+ 15 credit hours	65,919	44,914-70,719	508
Master's Degree+30 credit hours	69,343	46,317-72,523	486
Master's Degree+ 45 credit hours	72,023	47,717-74,332	396
Master's Degree +60 credit hours	74,625	49,323-76,336	1,048
Doctorate Degree	77,294	55,319-78,009	69
Middle School			
Bachelor's Degree	58,736	40,707-65,310	114
Bachelor's Degree + 15 credit hours	61,301	42,110-67,109	156
Master's Degree	62,758	43,508-68,915	180
Master's Degree+ 15 credit hours	66,663	44,914-70,719	189
Master's Degree+30 credit hours	69,529	46,317-72,523	162

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APPENDIX C2 (Continued)

	Average	Range	Count
Master's Degree+ 45 credit hours	72,043	47,717-74,332	137
Master's Degree +60 credit hours	73,975	49,323-76,336	320
Doctorate Degree	76,757	55,319-78,009	39
High School			
Bachelor's Degree	59,446	40,707-65,310	121
Bachelor's Degree + 15 credit hours	64,858	42,110-67,109	195
Master's Degree	63,711	43,508-68,915	195
Master's Degree+ 15 credit hours	67,557	44,914-70,719	271
Master's Degree+30 credit hours	70,163	46,317-72,523	190
Master's Degree+ 45 credit hours	72,265	47,717-74,332	224
Master's Degree +60 credit hours	74,871	49,323-76,336	469
Doctorate Degree	77,519	55,319-78,009	66

Notes: For a small number of Boston teachers we were unable to precisely identify type of school or salary, and so they are not included here. All data were compiled by the authors from the data provided by the school districts.

APPENDIX C3
Teachers' Salaries in Mobile Public Schools

	Average Salary	Range	Count
Elementary School			
Bachelor's Degree	33,040	29,538-37,364	1,063
Master's Degree	40,066	29,538-54,276	1,041
Specialist Degree	44,239	40,288-49,257	57
Doctorate Degree	42,814	29,538-48,832	7
Middle School			
Bachelor's Degree	33,380	29,538-37,364	372
Master's Degree	39,620	29,538-47,571	365
Specialist Degree	44,270	40,288-45,527	20
Doctorate Degree	46,125	45,710-46,541	2
High School			
Bachelor's Degree	33,723	29,538-62,371	429
Master's Degree	41,035	29,538-57,723	462
Specialist Degree	48,917	34,368-60,037	34
Doctorate Degree	48,081	39,286-60,279	8

Notes: All data were compiled by the authors from the data provided by the school districts.

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