Student Sorting and Achievement

School administrators face myriad choices when deciding how to best educate their students under the resource constraints they face. One policy that has received little attention in the public discourse but can have important implications without increasing costs is the sorting of students into classrooms. By thoughtfully sorting students according to their abilities, schools might enhance student learning without adding to the taxpayers’ burden.

In PERC working paper 1303, PERC Research Fellow Li Gan and Courtney Collins examine schools’ decisions to sort students into different classes and what impact those decisions have on student achievement. Using data from Dallas, which includes both test scores and class information, they find that sorting students more homogeneously increases educational attainment. They focus on sorting by previous performance but also explore other potential sorting dimensions.

In an attempt to increase the quality of primary education, both federal and state lawmakers in the US have enacted numerous policies in the past decade. President Bush’s No Child Left Behind legislation expanded the role of standardized testing to measure school performance while President Obama’s Race to the Top program promoted measures of teacher and administrator performance as well as alternatives to public schools. Additionally, many states and municipalities have encouraged the growth of charter schools and expanded access to private.

Because of the increased scrutiny of schools’ performance, administrators have faced the challenge of increasing quality without concomitant increases in resources. These circumstances have forced them to look for resource-neutral adjustments. One such adjustment would be to modify the process schools use to sort students into classrooms. As many schools have too many students to allot only one teacher per grade, the method with which students are assigned to each class is one possible opportunity.

Sorting students by achievement can have two effects: a peer effect and a “tracking effect.” The former comprises students collaborating with other students. Collaboration would benefit groups containing only high-achieving students but impair groups containing only low-achieving students. Conversely, teachers confronting only one type of student could tailor their lessons to the narrower needs of a more homogeneous group. This “tracking effect” would benefit both low-achieving and high-achieving students. For the low-achieving students, the question would be which effect dominates the other.

Numerous studies have explored both peer and tracking effects. Because the two effects are inextricably linked (when classes are homogeneous, both effects will be present), it is important to disentangle the two. Papers concentrating on tracking have found evidence of tracking, especially in secondary education, but have achieved mixed results on their efficacy, both for high achievers and low achievers. With regards to peer effects, again researchers have found positive and negative effects for low achievers.

Gan and Collins estimate two models: one that isolates the effect of sorting for each group and one that estimates an average effect for everyone. They consider sorting according to the previous year’s test score as well as gifted, special education, and limited English proficiency status. They construct an index to assess the degree of sorting for each classroom individually as well as the school overall. They then take the ratio of those indices to create a measure of...
the dispersion in the classroom relative to the school.

Because the schools could be sorting students on characteristics not included in the model but are correlated to their performance (such as desire to have a particular teacher or behavioral problems), it is important to instrument for this index. The authors do so by using the index calculated for one grade below the grade being studied. Since the school probably has similar sorting procedures for different grades in a given year, this should be a valid instrument. Doing so, though, requires them to combine the figures for the lower grade’s classes into an average index.

The Dallas Independent School District provides the data for this study; the data are especially suited for this since they include both test scores as well as classroom information, which most data don’t. In addition to test scores, it contains race and gender information and identifiers for reduced lunch, gifted, special education, and limited English proficiency students. Their data show that almost 75 percent of schools in the district sort along at least one dimension. Limited English proficiency status is the most popular criterion—57% of schools use it to sort students. Only 19 and 24% of schools sort along math and reading scores, respectively. They find that schools with higher variations in scores and higher proportions of certain types of students are more likely to sort them.

The average effect of sorting for all students is positive and significant, and it is larger for math than reading. This suggests that sorting by the previous year’s math score has a positive impact on student achievement. In addition, the results hold for both high and low achieving student groups. Sorting on characteristics other than test scores, however, had no significant impact.

There is substantial room for improvement in the US education system. Policymakers at all levels as well as teachers and school administrators have recognized many problems and proposed a multitude of ideas to address them. Gan and Collins provide some additional evidence on one approach that could benefit students without raising costs.

### Charter Schools in Alternative Education

Alternative to traditional public schools have become more and more prevalent over the past decade, as dissatisfaction with the government monopoly has pushed policy makers to provide more choices for their constituents. Analysts continue to debate the comparative performance and effectiveness of the different types of schools without conclusive results.

**Perc Research Fellow** Tim Gronberg, **Jordan Professor of Economics** Dennis Jansen and Lori Taylor investigate the performance of charter schools in **Perc** working paper 1305. In particular, they focus their attention on alternative education campuses—schools that concentrate on students more likely to drop out. They estimate the effectiveness of the different types of schools using frontier analysis and find that the charter schools as a whole are more efficient than their public counterparts.

The state of Texas offers an additional environment in which to compare the performance of private charter schools to public. In addition to traditional schools which instruct the students who progress through school one grade per year and graduate after twelve, Texas also has schools which cater to the students in danger of dropping out of school before they earn their diploma; charter schools compete with public schools in both spaces.

The alternative schools enroll students based on poor performance on classroom and/or standardized tests, limited English proficiency, and pregnancy. Because of their student population, these schools, whether public or private, likely organize and operate differently from traditional schools. The authors expect that the ability of these schools
to concentrate on a subset of students permits the alternative schools to operate more efficiently than traditional schools. Additionally, the reduced burden of regulation permits the charter schools to operate more efficiently than the public.

Charter schools can be managed either by existing school districts or independent agencies. In 2010-11, there were 199 of the latter operating 482 campuses and serving about 3% of public school students in Texas. They are forbidden to charge tuition but can serve only a subset of grades and limit enrollment. About one quarter of all independent schools are alternative education campuses (compared to 3% for public schools).

Alternative schools’ population is disproportionately nonwhite, low income, and limited English proficient. They are also more likely to be in metropolitan areas. The independent agencies that run charter schools depend on state and federal funds, as well as private contributions. The basic formula that determines state funding is largely the same for independent agencies and public districts, though public districts are eligible for adjustments. Federal funding is similar.

Gronberg et al. use stochastic frontier analysis to estimate and compare the efficiencies of the different school types. Essentially, they estimate a cost frontier for all the schools and determine how far from the frontier each school operates.

The cost function requires variables for total cost, outcomes, purchased input factors, and un-purchased input factors. For total cost, they use per-pupil operating expenditures excluding food and transportation. The outcomes comprise both quantity and quality measures. For quantity they use enrollment, and for quality they use dropout rate and a measure of student performance on standardized tests.

As to inputs, the authors use a wage index independent of district hiring practices. It is estimated independently based on observed teacher salaries and characteristics as well as school characteristics. They found that while charter schools run by public districts provide a premium to teachers in alternative schools, those run by independent agencies pay a discount.

Using stochastic frontier analysis allows the authors to estimate how different factors contribute to the efficiency of the school. In this case, they want to determine whether the independent agencies are more efficient. Additionally, they include indicators for whether the school was an alternative education campus and the size of the school. They also allow for efficiency to evolve over time.

The authors find that, as expected, higher dropout rates reduce costs, students with higher test scores increase costs, and higher salaries increase costs. They also find that costs increase with grade levels as well as proportion low income, special education, and limited English proficient. More significantly, they find that independent agencies operate at lower costs than public school districts and that alternative education campuses are lower cost than traditional campuses.

As for the cost frontier, the authors find that independent agencies operate alternative education campuses at lower cost than the public school districts, while in the traditional schools public schools dominate. This leads them to conclude that charter schools have access to a lower-cost technology, but because the individual schools are actually farther from the cost frontier, they don’t take full advantage of it. The efficiency estimates also suggest that among alternative education campuses, independently chartered schools outperform publicly chartered.

As more charter schools participate in education, policy-makers need to understand the relative benefits they bring to students and taxpayers. Many studies have explored whether they produce results as well as whether they cost effectively do so. Alternative education campuses present a niche in which charter schools have a competitive advantage, and those struggling to improve the education system should recognize this fact and adopt policies to take advantage of it.