

POLICY BRIEF 2016-02

Improving Academic Outcomes for Disadvantaged Students: Scaling Up Individualized Tutorials

MARCH 2016



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Director

Improving Academic Outcomes for Disadvantaged Students: Scaling Up Individualized Tutorials

Improving the educational outcomes of economically disadvantaged children is a policy priority in the United States, and yet relatively little progress has been made in recent decades. Some observers have come to believe that the effects of poverty make it all but impossible for schools and teachers to substantially improve the academic outcomes of disadvantaged children. This pessimism stems in part from the fact that relatively few educational interventions have been shown to significantly improve children's academic and economic outcomes. Although some early childhood programs show lasting benefits, there are fewer success stories for disadvantaged children of school age, particularly adolescents.

While the test score gap between black and white students narrowed during the 1980s, in the past decade white students scored, on average, about 0.8 standard deviations higher than black students on the National Assessment of Educational Progress (NAEP), also known as the "Nation's Report Card." This test score gap is roughly equivalent to what the typical American teenager learns from eighth grade through the end of high school. Viewed in terms of economic outcomes, a change in test scores of 0.8 standard deviations would be expected to translate into a difference in annual earnings of 22 percent. A similar test score gap exists between white and Hispanic students, whose average NAEP scores are about 0.7 standard deviations lower than those of their white peers. Such disparities are not limited to test scores: black and Hispanic youth are about 60 percent more likely to drop out of high school than are white students. In addition, the achievement gap between rich and poor students has increased substantially over time and now exceeds the black-white gap—with children in families at the 10th percentile of the income distribution scoring, on average, more than a full standard deviation below children in families at the 90th percentile.

Education reforms that aim to address these gaps often focus on improving the quality with which grade-level material is taught, or the incentives that students have to learn it. Yet such efforts may not adequately account for important differences within a classroom of students—differences in knowledge, in learning styles, or the rates at which students learn. As a result, in spite of these efforts, students who fall behind grade-level material tend to stay behind. When these students miss developing crucial foundational skills, they can have major difficulties understanding subsequent learning tasks, which worsens the gap between them and their grade-level peers as they move from one grade to the next.

One consequence is that by high school many students in distressed communities can be several years or more behind grade level. To take one example, 40 percent of Chicago eighth graders were below basic level in math in the 2011 NAEP. This problem is especially pronounced in math, because each grade lays a crucial foundation for the next: multiplication builds on addition, algebra on arithmetic, trigonometry on geometry, and so on. The result for many students is a mismatch between what regular classroom instruction delivers and what they need to succeed.

In a new Hamilton Project policy proposal, Roseanna Ander of the University of Chicago, Jonathan Guryan of Northwestern University, and

Jens Ludwig of the University of Chicago propose scaling up a program that delivers highly individualized instruction in a small-group tutorial setting primarily to students who have fallen behind grade level in math, aiming to bring students back up to grade level so that they can reengage with regular classroom material.

The proposal is modeled after a tutorial program in Chicago that offered intensive instruction to public high school students—many of whom were below grade level in math—through daily in-school sessions, with just two students per tutor. The small student-tutor ratio allowed for highly individualized teaching—a student who had not yet mastered multiplying two-digit numbers could start there, while another student in the same room who was comfortable with basic algebra could work on more-advanced topics.

Delivered to predominately minority students in some of Chicago's most disadvantaged public high schools, the tutorials showed large impacts: participants learned one to two additional years of math in a single school year above what students typically learn in a year; the program effectively narrowed the black-white test score gap by almost a third in just one year.

Ander, Guryan, and Ludwig argue that scaling up this tutorial program has the potential to help economically disadvantaged students attending under-resourced schools do better in math, narrow the black-white test score gap, reduce the achievement gap between poor and rich children, and improve high school graduation rates in the country's most disadvantaged neighborhoods.

The Challenge

While some early childhood programs have been shown to improve children's academic and economic outcomes, few programs for disadvantaged students of school age, particularly for adolescents, have shown similar success. It is possible, though, that these interventions have failed to target a key barrier to learning. Classrooms and grades are not well structured to handle differences across students in learning style, learning pace, and accumulated knowledge. Consider the immense challenge that a teacher in a ninth-grade classroom faces if some students in the class can do math at a ninth-grade level, others have mastered math only at a fourth-grade level, and the rest of the class falls somewhere in between. How does the teacher teach without either the advanced students getting bored or the struggling students falling behind? The challenge gets worse as students progress from grade to grade; without critical foundational knowledge, much of regular classroom instruction has little benefit, allowing the gap between grade-level students and those left behind to progressively widen. It becomes very difficult for a student to get back into a position to reengage with classroom material, and the mismatch between classroom instruction and student needs stubbornly persists.

The challenge may be particularly pronounced in urban areas where many students come from economically disadvantaged backgrounds. For example, youth in Chicago who were at highest risk for school failure and crime were on average four—and up to ten—years behind grade level in math by high school.

The shift in the focus of policy toward accountability reforms places increasing pressure on teachers to demonstrate that students are mastering grade-level content, which in turn tends to drive curriculum decisions; but urban school systems often lack adequate safety nets to bring students back up to grade level once they have fallen behind. Time and resource constraints make it difficult to tailor classroom instruction

to each student's particular knowledge level. Thus, in an important way, the challenge is one of economics. Many public school systems, especially in big cities, struggle to balance their books running systems that have 20 or 30 students, or even more, per class. Given these fiscal constraints, the kind of individualized instruction necessary to bring students back up to grade level would appear impossible to achieve. These constraints remain a key systemic barrier to helping students from disadvantaged backgrounds succeed in school.

For decades, education researchers have understood that small-group tutoring generates important benefits for learning. Compared to regular classroom instruction, tutoring increases time on task, the amount of feedback and correction between student and instructor—a key characteristic of effective teaching—and improves student attitudes and interest. However, small-group tutoring by regular teachers is widely viewed as too costly to undertake on a large scale.

The authors point out, however, that tutoring is fundamentally different from regular classroom teaching. To become a licensed and expert classroom teacher in a traditional public school requires extensive formal training or specialized degrees, demonstrations of content knowledge on standardized exams, as well as several years of on-the-job learning. However, many of the tasks associated with successful classroom teaching—such as classroom management—are not relevant to teaching just one or two students at a time. Tutors must have the following qualities: they must be knowledgeable in the subject they teach, they must be good at explaining things, and they must have a positive attitude about every child's potential to learn. An intervention built around small-group instruction need not depend on expert regular-classroom teachers and can tolerate high levels of instructor turnover because on-the-job experience is not as critical as it is for classroom teachers.

A New Approach

Based on this insight, the authors propose scaling up a tutorial program designed to support economically disadvantaged students who are behind grade level in math. Specifically, they propose scaling up a program created by Boston's Match Education (Match), and now delivered by SAGA Innovations (SAGA), which hires talented people to serve as math tutors for one year, as a public service, for a modest stipend. The low cost per tutor enables the Match/SAGA tutorial program to provide students who have fallen behind grade level in math with intensive instruction in a small-group setting, in order to help students return to a position where they can start to benefit again from regular classroom material.

In the tutorials, two students are paired with a single tutor for a daily, 50-minute class period in which tutors can meet each student at his level of knowledge, amounting to as many as 150 hours of individualized instruction per academic year in the Chicago context. The two-to-one ratio allows the tutor to develop a relationship with each student, provide instruction to help get past stumbling blocks, and encourage the student to keep moving forward after successes. Tutors teach for six or seven periods of an eight-period school day and are overseen at each school by a full-time site director who handles behavioral issues in the tutorial room and communication with school staff, and offers daily feedback and professional development to tutors. An important distinguishing feature of the tutorial is that it takes place during the school day as a credit-bearing elective with a structured curriculum.

The authors propose that all school districts receiving schoolwide Title I funds provide daily, individualized, in-school tutorials to all students in the third through tenth grades who are at least two grades behind grade

level in math, as determined by an assessment at the beginning of the academic year or at the end of the preceding year.

In the tutorial one tutor would work with two students per session for one class period per day. Students would be enrolled in the math tutorial in addition to their regular math class. Where appropriate (e.g., in middle and high school grades), the tutorial would be treated as a required course, with students receiving course credit and a grade. When the student progresses to grade level, the tutorial would be discontinued. Students who remain behind grade level could continue in the math tutorial for multiple years.

Given that a similar program in Chicago was shown to double or triple the amount of math that students learn over the course of a year (described in the Benefits section below), it is likely that most students would need just a year or two of this intensive safety-net intervention to catch up to grade level, at which point they would begin to benefit from regular classroom instruction. Thus the authors emphasize that their proposal is a complement to and acknowledgment of, but not a substitute for, ongoing policy efforts to strengthen regular classroom instruction, as well as other common targets of school reform.

The Match/SAGA Tutorials

Under the Match/SAGA tutorial model, part of the tutorial session is focused on remediating students' skill deficits, for which Match/SAGA has its own skill-building curriculum. Tutors tailor instruction to students' current skill level, often starting with basic math skills or the lowest math level that a student has yet to master. As the students progress, they work toward more-advanced coursework. The bulk of each session is also tethered to what students are working on in their math classrooms or what they will face in state or national math exams at the end of the year.

The Match/SAGA tutorial approach uses frequent internal assessments of student progress to continuously individualize instruction and benchmark achievement. Daily "tickets to leave" exercises are mini-assessments with one to three questions about the day's lesson that allow the tutor to revise the next day's lesson. Within the tutorials, the year is divided into seven to ten course units, each with a pre-test and post-test, that help tutors determine how much review time is needed before the next unit. Quarterly proficiency assessments consist of 50 questions of basic math skills, administered at the beginning of the school year and up to four other times in the year; these assessments help tutors identify areas the student has not yet mastered for the next quarter. These numerous assessments allow tutors to constantly and consistently measure student progress and tailor curricula to meet their students' needs.

The tutorials could be administered by organizations like SAGA, which is currently delivering individualized math tutorials in Chicago, New York City, and elsewhere. SAGA could deliver tutorials at a significantly larger scale, but the tutorial framework is highly replicable, so in principle nothing would preclude any other well-run nonprofit organization from implementing a model with a similar curriculum and framework. The Match/SAGA tutorial program has the advantage of being fairly well reverse-engineered. The program developers have a good sense of what key program elements make it successful: smart, enthusiastic tutors who will work for one year for a modest stipend, who are selectively screened, and intensively supervised. Having exported the model to Chicago and

New York, SAGA has a fairly well-developed set of instructions to offer new providers or franchisees in other cities. Eventually, the authors envision that school districts would integrate the program into the regular school day on a wide scale.

The authors evaluated a pilot program of this kind of tutorial in twelve disadvantaged public high schools on the high-crime and low-income south and west sides of Chicago. They worked with the Chicago Public Schools system to identify 2,718 male incoming ninth- and tenth-grade students estimated to be at elevated risk of dropout, but not at such high risk that truancy would prevent them from benefitting from a school-based program. Of the youth in the study, 95 percent were either black or Hispanic and 90 percent were eligible for free or reduced-price lunch. In the year before the intervention the students had an average GPA of 2.2 on a 1-to-4 point scale and had missed about a month of school, while half had failed at least one course; one in five had been arrested prior to the start of the study.

The authors focused on math skills partly because failure to complete required core math classes is one of the key drivers of high school dropout in Chicago. Another reason for the focus on math is that a growing body of research shows the importance of math specifically for short- and medium-term success in school, as well as for long-term economic outcomes such as employment and earnings. The authors focused on male youth partly because their graduation rates and test scores lag behind those of females.

In the 2013–14 academic year the authors used a randomized-controlled trial to evaluate the effects of the program. In a randomized-controlled trial a fair lottery system is used to determine who is invited to participate in the program. This design allows researchers to measure the effects of a policy, holding outside factors constant, in essentially the same way that the medical field conducts trials to assess the effectiveness of new drugs and therapies. The authors measured the effect of the Match/SAGA tutorial program on test scores and grades, holding constant other factors that might have affected students' school performance.

Benefits

The authors found that the program had large positive impacts on students' academic performance, consistent with the results of a similar tutorial program in Houston public high schools that was implemented with a whole set of school reforms. The Chicago Match/SAGA tutorial created large gains in academic outcomes in a short period of time, even among students many years behind grade level. Compared to a control group, participants had significantly higher test scores, math grades, and grades in their other classes, as well as fewer course failures. The authors found that Match/SAGA tutorials helped students learn between one and two extra years of math above what the typical American high school student learns in one year.

Viewed from a different angle, Match/SAGA tutorials moved students on average from about the 34th percentile to about the 42nd percentile in the national distribution—in other words, the program closed about *half the gap* between participants' math scores prior to the tutorials and the national average. In terms of "effect size" units, or standard deviations, the authors found that Match/SAGA tutorials improved students' scores by 0.19 to 0.30 standard deviations, depending on the exact test and norming used. As one way to assess the magnitude of these effects, 0.27 standard deviations is equal to about one-third of the black–white test score gap in math in the NAEP among 13-year-olds. However, the authors are careful to note that providing the intervention universally would not cut the black–white test score gap by this much each year, since the effects could be different for different populations.

Roadmap

- School districts receiving schoolwide Title I funds will adopt a tutorial program based on the Match/SAGA model in which tutors provide daily, individualized, in-school tutorials to all students in the third through tenth grades who are at least two grades behind grade level in math. In the tutorial, one tutor will work with two students per session for one class period each day. Students will be enrolled in this in-school tutorial in addition to their regular math class.
- To finance this tutorial program, school districts will use Title I funds made available through the December 2015 reauthorization of the Elementary and Secondary Education Act as the Every Student Succeeds Act (ESSA). Such use of Title I funds does not require a waiver under the reauthorization. School districts can also make use of the grant program established in ESSA that allows state education agencies to reserve up to 3 percent of funding for direct student services programs like the tutorials that the authors propose here.

The authors found similarly sized impacts using two independently administered math achievement tests, which suggests that the results do not reflect a narrow "teaching to the test" by the Match/SAGA tutors. A similar conclusion is suggested by the fact that math grades improved: Chicago Public Schools math teachers themselves saw sizable gains in math performance among the students who participated in Match/SAGA tutorials. The program improved math grades by 0.58 points on a 1-to-4 point scale, a sizable gain compared to the average math GPA among the control group of 1.77 (or essentially a C minus average). The authors also found that the program cut in half the chance that students failed their math course.

Even though Match/SAGA tutorials focused specifically on math, the students in the program improved their performance in other subjects—reducing the chances of failing non-math courses by about one-quarter. It is not known whether this occurred primarily in subjects that reward math skills, such as science, or if success at math helped to change the students' motivation, feelings of self-efficacy, or institutional attachment.

The authors did find that the students who received the math tutorials were more likely to report that they "liked math," that they were "good at math," and that their friends "did not study enough." It is unlikely that friends of students receiving the tutorials reduced their study habits; instead, the tutorial appears to have changed the participants' mindset around school and how much studying is "enough." The combination of working on math problems appropriate for students' skill level and individualized support from tutors likely helped the tutorial participants to see what they were capable of. Once they saw that they could do some math problems, it became easier for them to do problems that were even more complex. It is possible that they then saw that their friends were missing out on this

Learn More about This Proposal

This policy brief is based on The Hamilton Project policy proposal, “Improving Academic Outcomes for Disadvantaged Students: Scaling Up Individualized Tutorials,” which was authored by

ROSEANNA ANDER
University of Chicago

JONATHAN GURYAN
Northwestern University

JENS LUDWIG
University of Chicago

satisfying process—learning—by not studying enough. The degree to which these mechanisms could be replicated in a version of the tutorial that changes the group size slightly or supplements the tutor’s time with the use of technology remain critical questions to investigate as part of the scale-up process. The authors continued to evaluate the program in the 2014–15 academic year, expanding to youth across 15 high schools in the Chicago Public Schools system, and are currently analyzing results from the full two-year study.

The large gains for disadvantaged youth stand against a backdrop of few prior success stories in improving academic outcomes, particularly achievement test scores, for similarly disadvantaged adolescents. The impacts on academic achievement per dollar spent were sizable compared to even the most successful early childhood programs.

Costs and Funding

The authors propose that school districts—both urban and rural—adopt this tutorial program using Title I funds made available through the December 2015 reauthorization of the Elementary and Secondary Education Act as the Every Student Succeeds Act (ESSA). Such a use of Title I funds would not require a waiver under the reauthorization. ESSA also established a grant program that allows state education agencies to reserve up to 3 percent of funding for direct student services programs such as tutoring. Along with other in-school programs including advanced placement courses, credit recovery, or early college high school pipelines, the bill language suggests using this provision for “components of a personalized learning approach, which may include high-quality academic tutoring” (Sec. 1003A(c)(3)(D)). School districts that apply for an award under this section must demonstrate how services to the lowest-achieving students would be prioritized. This could serve as an additional source of funding for the tutorials.

The key insight of the Match/SAGA tutorial model is that the economic barrier to individualizing education within big-city public school systems can be overcome by attracting talented people to tutor for one year as a public service, for a modest stipend. Many of the tutors in the Chicago program were recent college graduates who wanted to dedicate a year to community service, but also included retirees and others interested in the program’s mission. The costs of the Chicago program were around \$3,800 per student, and are predicted to fall to \$2,500 per student when carried out at large scale in a district. The per-pupil cost is low because the program

selects individuals who can succeed in tutoring two students at a time, but typically do not have the extensive training and experience required to successfully teach classrooms of students. Because less preservice training is necessary, the Match/SAGA tutorial can hire instructors who commit to this work for just a single school year for a modest stipend.

Whether scaling up this program is a worthwhile investment depends crucially on a comparison between its costs and its expected long-term benefits. To calculate these benefits, the authors draw on work in the academic literature that estimates the increase in earnings resulting from a given increase in test scores. Combining this estimate with the results of the Chicago program, which increased math test scores by seven percentile points, the authors calculate that the tutorials would be expected to increase participants’ adult earnings by between \$700 and \$1,050 each year. Calculating the present discounted value of these gains back to age 15, the authors estimate that the benefits of the tutorial would be roughly 5 to 11 times larger than the costs—suggesting that investment in this tutorial program is economically worthwhile. As an alternative measure, the authors calculate benefit–cost ratios under the extreme assumption that it would be necessary to deliver four years of tutorials to a student to maintain the test score impact in the Chicago study. Even in this extreme case, the authors calculate that the benefits would be 1.3 to 2.9 times as large as the costs. These estimates suggest that this type of tutorial program is a cost-effective way to improve learning and economic outcomes for disadvantaged youth.

Conclusion

The need for a more robust safety net for students who fall behind grade level is a key systemic challenge for many urban school districts. Education reforms that do not adequately account for differences within a classroom of students, such as learning style, learning pace, and accumulated knowledge, will not be able to effectively meet this need. Absent such a safety net, students who fall behind will tend to stay behind: without developing crucial foundational skills, students can have major challenges succeeding in subsequent learning, which worsens the gap between them and their grade-level peers as they move from one grade to the next. Students who are four to six years behind grade level—unfortunately not an uncommon occurrence in distressed urban areas—have likely been getting very little or virtually nothing out of regular classroom instruction for years.

Some observers have come to believe that it is essentially impossible to make large gains in the academic outcomes of minority adolescents living in economically disadvantaged, distressed, and dangerous communities. The authors’ evaluation of the Match/SAGA tutorial program suggests otherwise. Based on their results, the authors argue that a scaled-up tutorial program would help students across the country get back up to grade level—at which point they could begin to successfully reengage with and benefit from the material taught in their regular classrooms. According to the authors’ calculations, the costs of such a program would be more than offset by its benefits, as measured by the predicted gains in lifetime earnings among students who participate in the tutorials.

The authors will continue to study different variations of the program and how it can be most effectively scaled up. If the impacts in the Chicago program can be replicated at large scale, the authors argue that this individualized tutorial program has the potential to be a transformative strategy in public education, helping the most at-risk youth catch back up to grade level, reengage with regular classroom instruction, and gain real hope for a diploma and all the long-term economic benefits that go along with academic success.

Questions and Concerns

1. Should students who are not in economically disadvantaged schools participate in these tutorials?

Tutorials of the kind proposed in this paper would likely be effective for students who have fallen behind grade level, no matter what type of school they attend. It is likely that school districts with the resources to do so already incorporate individualized instruction into their classrooms. While the authors have not studied the impacts of the tutorials in a high-income school district, they suspect that the tutorials would be effective in this setting and encourage well-funded districts to consider adopting the program.

2. If a school cannot implement the tutorials at the full scale described in the proposal, how should it allocate seats?

Districts that cannot devote enough funding to serve all of their third- through tenth-grade students who are scoring two grades behind grade level in math should select which students to enroll in the program by randomized lottery. This will allow districts to compare the academic performance of the students enrolled in the tutorials to the performance of the students not enrolled, and thereby measure the tutorials' impacts on academic achievement. This kind of evaluation—a randomized controlled trial—will not only help districts learn how effective the tutorial program is for their student population, it will also help other schools learn what implementation approach works best.

3. Why does the tutorial program need to be in school rather than after school?

It appears that a key reason the Match/SAGA tutorials are effective is that students spend a large amount of time focused on doing math, and do it every day. Attendance rates might be lower in an after-school tutorial, and students could be less focused and engaged with the work.

4. How many tutors would be needed each year to deliver tutorials on the scale proposed?

The authors estimate that to offer tutorials to, for instance, one-quarter of all third- through tenth-grade students at the 100 largest public school districts in the United States, it would require about 140,000 tutors each year. This scale is far beyond what the authors have studied. It may not be possible to recruit that many effective tutors each year without offering a stipend that would make the tutorial program cost-prohibitive. The authors are currently developing methods to study this question. An alternative may be to offer the tutorial only to students who are significantly farther behind grade level. For example, it would require fewer than 50,000 tutors to serve 10 percent of all third- through tenth-grade students at the 100 largest school districts. Another possibility would be to limit tutorials to ninth and tenth graders, where there is rigorous evidence of effectiveness. It would require about 35,000 tutors nationwide to serve one-quarter of all ninth and tenth graders at the 100 largest school districts, and 14,000 to serve 10 percent of all ninth and tenth graders in those districts. As a point of comparison, each year about 75,000 people participate in AmeriCorps, about 5,000 work as Teach For America corps members, and about 3,000 participate in City Year.

Highlights

Economically disadvantaged students who fall behind grade level and miss developing crucial foundational skills can have major difficulties in subsequent grades and later in the workforce. Roseanna Ander of the University of Chicago, Jonathan Guryan of Northwestern University, and Jens Ludwig of the University of Chicago propose scaling up a tutorial program that would allow students who have fallen behind grade level to reengage with regular classroom instruction, likely improving their chances of graduating high school and achieving the many long-term economic benefits that go along with academic success.

The Proposal

Individualized Tutorials. School districts would deliver daily, individualized, in-school tutorials to all students in the third through tenth grades who are at least two grades behind grade level in math. A single tutor would be paired with two students for a full-period tutorial session during each school day. The content of the tutorial would be customized to the students' level of knowledge and learning style, allowing students to work back up to grade level and begin benefitting again from regular classroom instruction.

Funding the Tutorials. To finance the tutorial program, school districts would use Title I funds made available through the December 2015 reauthorization of the Elementary and Secondary Education Act as the Every Student Succeeds Act (ESSA), including the grant program established in ESSA that allows state education agencies to reserve up to 3 percent of funding for direct student services programs such as the tutorials that the authors propose here.

Benefits

The need for a more robust safety net for students who fall behind grade level is a key systemic challenge for many urban school districts. The authors' proposals would meet this need by bringing students back up to grade level so that they can reengage with regular classroom instruction. The program on which the proposal is based—tutorials offered to predominately minority students in some of Chicago's most disadvantaged public high schools—substantially increased students' standardized test scores and school performance. In one year, participants learned between one and two extra years of math above what the typical American high school student learns in that period. The program's tutors are talented people interested in dedicating a year to public service in exchange for a modest stipend. With the program's relatively low labor costs, the authors calculate that the costs of the tutorials would be more than offset by their benefits, as measured by the predicted gains in future lifetime earnings among the participants.



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