



## Beating the Odds:

### *The Real Challenges Behind the Math Achievement Gap— And What High-Achieving Schools Can Teach Us About How to Close It*

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#### Executive Summary

One of the largest and most persistent inequities in the modern American education system is the gap in math achievement along income and race lines. *Beating the Odds*, prepared for the Carnegie-IAS Commission on Mathematics and Science Education, argues that the math achievement gap is not, as commonly viewed, primarily the result of poor and uneven math instruction in urban schools, though that has exacerbated the problem. Rather, the math gap appears to be the result of two deeper, generally overlooked factors:

- The broader failure in the schooling experience of low-income and minority students that leaves many of them discouraged and disengaged, lacking the confidence to tackle challenging work and the resilience to persist in solving difficult problems.
- The particular failure of math classrooms to address the psychological and learning needs of students who have not experienced success in math previously, without watering down critical content.

But as intractable as the gap may appear, there is mounting evidence that we are capable of closing it. This paper highlights a promising trend—the growing number of academically rigorous small schools that are beating the odds by bringing the highest-need students to high levels of math achievement. Their success stems from their willingness to address the deep-rooted instructional and organizational flaws of traditional school design. Taking the best ideas from the “small schools movement” of the 1980s and 1990s, which created effective learning environments for students at risk of failure in large urban settings, these new small schools have been able not only to retain struggling students but also to prepare them for college work.



*Beating the Odds: The Real Challenges Behind the Math Achievement Gap* is a publication of Jobs for the Future, prepared for the Carnegie-IAS Commission on Mathematics and Science Education.

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## **Distinguishing Features of “Closing the Gap” Small Schools**

A critical difference in these schools is their culture. It is their explicit mission to eliminate the psychological barriers to learning which too often are ignored in traditional schools. Staff strive to create a nurturing yet challenging atmosphere that celebrates small successes and convinces students over time that they can master a college-prep curriculum. Everyone is held to the same high standards, regardless of their entering skill level, and regular help is available for those who need it. The belief that every student can attend college and succeed there permeates every aspect of school life.

This culture of success is reinforced in every lesson with instructional techniques that break down complex concepts into understandable pieces. In math classrooms, teachers routinely provide students a range of ways to grasp difficult material and show they value multiple ways to solve problems. Effort, perseverance and academic risk taking are revered.

One of the most successful examples of this approach is the University Park Campus School in Worcester, MA. A partnership between the public school district and nearby Clark University, the school serves 226 students in grades 7-12 from the high-poverty neighborhood surrounding it. Despite the poor skills of entering students, UPCS has significantly raised math achievement to the level of the top high schools in the state while keeping dropout rates exceptionally low. UPCS emphasizes depth over breadth in its curriculum, but it also teaches much more than math content; students learn to approach tough problems with confidence, endurance and a sense of fun. Staff relentlessly send the message: “You can do this, and we will help you.” In grades 7 and 8, students get basic skills instruction along with exposure to higher-order concepts and problem solving to prepare them for four years of honors-level college-prep math in high school. Classes are small and heterogeneous; students get to know the faculty and feel comfortable seeking help. Frequent group activities encourage students to do their part while taking responsibility for ensuring that everyone understands the material. Explaining mathematical thinking, in conversation or in writing, is a must every day.

Some of the emerging early college high schools also are demonstrating success raising the math achievement of low-income and minority students who have struggled in traditional schools. Built on the same premise as UPCS—that at-risk students can succeed in a college-preparatory program with the right motivation and supports—early college high schools take this philosophy a step further by compressing the time to a college degree. While in high school, students earn one to two years of college credit for free on the theory that this can motivate many struggling students. While the schools are still fairly new, early results in New York and Georgia demonstrate that they are outperforming traditional schools in their districts, despite serving higher percentages of low-income students.

## **Implications for Action: Lessons from High-Achieving Schools**

The implications of these successes are clear—closing the math achievement gap will require much more than the conventional solutions of developing more talented teachers and engaging materials. It will require schools that can create a culture of confident and committed learners, no matter what their past educational experiences have been. It is particularly important to encourage the development of new small schools that connect students immediately to college aspirations, use a broad range of teaching methods and consistently demonstrate the value of effort and persistence. Staff development must focus not only content knowledge and pedagogical skill, but the ability to create a classroom environment of mutual support and love of learning. School leadership training must make school culture more central. Leaders and staff alike must observe exemplary math classrooms and schools so they can see these ideas in action.

*Beating the Odds* concludes by recommending several lines of inquiry to pursue in order to better understand what makes these exceptional schools work and what it will take to implement these practices on a large scale.