The Achievement Gap: Myths and Reality
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Source: *The Phi Delta Kappan*, Vol. 84, No. 8 (Apr., 2003), pp. 586-591
Published by: Phi Delta Kappa International
Stable URL: http://www.jstor.org/stable/20440430
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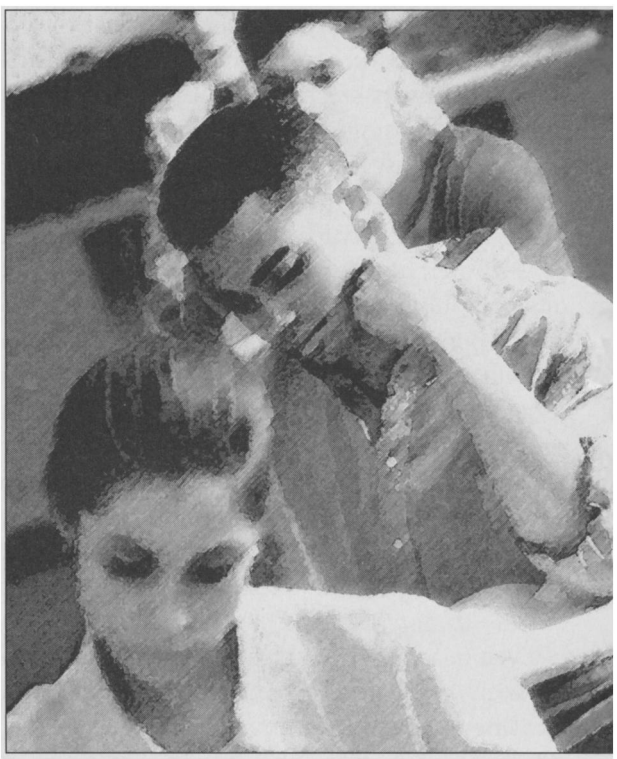
A SPECIAL SECTION ON *The Achievement Gap*

The Achievement Gap:
Myths and Reality

The repeated attempts to explain and solve the vexing problem of the achievement gap have clearly been inadequate, Mr. Singham points out. Perhaps we have been focusing on the wrong factors entirely, he suggests.

BY MANO SINGHAM



THE GAP BETWEEN the achievement of black students and that of white students is one of the most infuriating problems afflicting education. After all, it is clear that there is nothing intrinsic about "blackness" or "whiteness" that can be the cause of the gap.[1] There are no genetic or other immutable traits that could conceivably be the cause of the gap. Thus the problem is manifestly one that can and should be solved. In addition, this question has been studied extensively, and as a result we understand a lot more about the causes of the gap now than we did a generation ago.

Why then has the problem not been solved? As I will explain below, part of the problem is that the topic is fraught with myths. The difficulty with myths is not that they are necessarily false, but rather that they are beliefs whose truth or reality is accepted uncritically. It is relatively easy to debunk outright falsehoods. Much harder to overcome are those beliefs that have some element of truth in them but that are promoted with a single-minded determination that can undermine attempts to systematically solve the problem.

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The persistence and prevalence of these myths can be seen if you attend any meeting or read any newspaper editorial that deals with the causes of the achievement gap between black students and white students. You will find a range of analyses (and a corresponding variety of suggested solutions): biased standardized tests, tests that do not match the learning styles of black students, less money spent on educating black students, socioeconomic differences, lack of motivation, negative peer pressure, lack of family support for education, teacher biases, and many other possibilities. All of these figure prominently in the menu of causes.

What is wrong with all these diagnoses? In one sense, nothing. They all contain (or at least contained at some time in the past) some element of truth, and their adherents may be excused for espousing them. But none of them, by themselves, can come close to explaining the gap. Almost every hypothesis has some degree of validity; yet, when each one is carefully studied and solutions based on it are implemented, it fails to solve the problem.

For example, the test score gap shrinks, but only by a little, when black children and white children attend the same schools. Also, the average black child and the average white child live in school districts that spend almost the same amount per pupil.[2] Black/white income differences are found to have only a small effect on test scores.[3] Traditional measures of socioeconomic status (consisting of income, wealth, and parental education) account for at most one-third of the gap.[4]

Some studies also suggest that the social costs and benefits of academic success are about the same for blacks as for whites, thus casting doubt on the "negative peer pressure" theory, which asserts that, for a variety of reasons, black student culture is averse to high academic achievement. Both black students and white students do little homework outside of school. Median blacks and median whites do between two and four hours of homework per week, and only 14% of whites and 10% of blacks do 10 or more hours per week. Racial differences are also found to be negligible for skipping school.[5] Of course, such studies depend to some extent on self-reporting by students and are thus difficult to carry out with high accuracy. While the validity of these studies can be challenged on such grounds, it is clear that none of these popular notions are self-evidently true.

With most complicated problems, the usual strategy is to try to rank-order the problems and deal with them one at a time. But the failure to close the achievement gap may be telling us that such a linear approach may not be the best strategy for this particular problem. In fact, I will try to argue counterintuitively that, while specific actions targeted toward minority groups may be required in special situations, a better way to reduce or even eliminate the gap is not to focus on the gap at all but to look elsewhere.

It might be productive, for example, to look at the important role that mathematics education plays in the future success of students. Mathematics performance has been studied extensively and provides us with a wealth of data. One of the most interesting studies is by Clifford Adelman of the U.S. Department of Education, who conducted a detailed analysis of the factors that play a role in determining the rates of bachelor's degree completion.[6] He used data generated by the High School and Beyond longitudinal study, which followed a national sample of 28,000 students who were high school sophomores in 1980 until 1993 (when they had reached an age of roughly 30) to see what factors affected college graduation rates. Adelman found that, although the college-access gap between whites and blacks and Latinos has closed over the past two decades, the gap in degree completion remains 20% or higher. What is interesting is that socioeconomic status (SES) provides only a very modest contribution to this gap and that race/ethnicity matters very, very little.

So what *does* matter? What determines the degree-completion gap? Adelman found that a measure defined as "academic resources" (made up of a composite of high school curriculum, test scores, and class rank) has much greater power than SES in predicting college degree completion. For example, students in the lowest two SES quintiles, but with the highest academic resources, graduated at higher rates than the majority of students in the highest SES quintile. He also found that the impact of high school curriculum is far more pronounced *positively* for black and Latino students than any other measure and that this consistently overwhelms such demographic variables as gender, race, and SES. In other words, improving the high school curriculum has a *disproportionately* positive effect on students from groups that traditionally underachieve.

Within the high school curriculum, the highest level of mathematics a student has studied has the strongest effect on degree completion. Finishing a course beyond the level of Algebra 2 (for example, taking trigonometry or precalculus) more than doubles the odds that a student who enters college will complete a bachelor's degree.

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Why mathematics plays such a crucial role is a little puzzling. After all, most people manage to lead successful and productive lives without having to understand the mysteries of, say, the cosine function. For most everyday purposes, some facility with basic elements of arithmetic and perhaps some understanding of probability are all that people need.

But there are tangible advantages of knowing more mathematics. It can be argued that subjects that formerly were substantially qualitative (biology, psychology, economics, government, geography) are now taking on more quantitative aspects and that lack of comfort with mathematics can make students feel insecure about taking those subjects and thus undermine their performance to an extent that is well out of proportion to the actual quantity of mathematics involved. For whatever reason, mathematics has become a key "gatekeeper" course. Mathematics teaching and learning has also been the toughest educational problem; the subject typically has the lowest pass rates in proficiency tests.

Results show that use of the reform curricula significantly narrowed the gap between whites and underrepresented minorities, while increasing the performance of both groups in all categories.

Since mathematics clearly plays an important role in the future success of students, what does it take to reduce the achievement gap in mathematics education? An answer to that question might give us insights into how to address the overall achievement gap. Fortunately for us, the mathematics education community has, within the last two decades, made a determined effort to address the problems of mathematics education.

In 1989, the National Council of Teachers of Mathematics issued *Curriculum and Evaluation Standards for School Mathematics*, a document interweaving content (number, algebra, geometry, measurement, data analysis, and probability) with process (problem solving, reasoning and proof, connections, communication, and representation). By the mid-1990s, good curricula reflecting these standards were available for adoption. Large-scale data are now beginning to come in that will allow us to analyze the results of such standards-based education.

A recent study by Alan Schoenfeld points to some significant features.[7] Schoenfeld analyzed data from schools in Pittsburgh. This school system has challenging demographics: 40,000 students attend 97 public schools (59 elementary, 19 middle, 11 high, and 8 other); 56% of the students are black, and 44% are white or other; more than 60% of students qualify for free or reduced-price lunches. Most significantly for the purpose of this study, since the early 1990s, Pittsburgh has made a coherent effort to implement standards-based education in mathematics and other subject areas.

Schoenfeld's analysis distinguished between what were called "strong implementation" teachers and other teachers. The strong implementation teachers were those in whose classrooms students were familiar with activities and procedures specific to the reform curriculum, visual aids and manipulatives were accessible and showed clear signs of use, students had frequent opportunities to work together and explain their work to one another, student work showed curriculum-specific projects and activities, and no other curriculum was evident. The study compared the mathematics performance of students in what were called "strong implementation schools" (schools in which *all* the teachers were considered strong implementers) with that of students in "weak implementation schools" (in which at most only one or two teachers were strong implementers).

The results show that use of the reform curricula significantly narrowed the gap between whites and underrepresented minorities, while increasing the performance of *both* groups in *all* categories. On tests of so-called basic skills, scores for whites increased from 48% to 72% (a 50% increase), while scores for blacks rose from 30% to 75% (a 150% increase). On problem solving, white scores increased from 18% to 54% (a 200% increase), while black scores rose from 4% to 32% (a 700% increase). On mathematics concepts, scores for whites increased from 20% to 60% (a 200% increase), while scores for blacks increased from 4% to 40% (a 900% increase). Thus, while both groups improved, the scores for minority groups improved by much larger amounts.

What these data suggest is that it is possible to great-

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ly reduce (and in some areas eliminate) the gap in mathematics achievement through educational measures that do not directly target the achievement gap. The educational remedies adopted were not race-specific. The reductions in the gaps were achieved by a general focus on improving the educational achievement of all students, whatever their ethnicity, gender, or SES.

That such a broader effort at improvement is both necessary and desirable can be seen by looking at the latest NAEP (National Assessment of Educational Progress) results for mathematics. NAEP tests are given to representative cross-sections of students at various grade levels across the country and are graded on a 0-500 scale. For grade-12 students in 2000, the average white score was 308, and the average black score was 274.[8] A traditional focus on eliminating the gap would try to find ways to raise black scores to about 308, thus eliminating the 34-point gap. But even if we succeeded, would we have solved the underlying problem? Hardly.

I suggest that the gap we should be focusing on is the difference between where all students are now and where we believe they should be. The NAEP scores allow us to make this comparison because benchmark levels are specified, enabling one to make judgments about the levels reached by students. The reality is quite depressing. For students in grade 12, a basic level of achievement in mathematics (denoting partial mastery of knowledge and skills that are fundamental for proficient work) requires a minimum score of 288; a proficient level (representing solid academic performance and competency over challenging subject matter) requires a score of 336; an advanced level (representing superior performance) requires a minimum score of 367.

NAEP believes that all students should reach at least the proficient-level score of 336. But we see that the average NAEP scores of both white students and black students are well below the proficient level. In fact, only 20% of whites score above proficient levels, while only 3% of blacks are above proficient. So even if, after tremendous effort, we were to raise the average score of black 12th-graders to 308, both ethnic groups would still have 80% of students below proficiency. In other words, their performance would be equal, but equally dismal. There is little point in eliminating the gap in this way. It may solve the political problem of inequality, but it does not solve the educational problem of student underachievement.

What would it take to achieve the more worthwhile goal of having all students reach at least the proficiency level of 336? The Schoenfeld analysis of the Pittsburgh schools indicates that it takes a serious effort to provide all-round good teaching. It takes about 10 years of support and professional development (collaborative study, observation, knowledge of curricula, and lesson refinement as part of teachers' ongoing *daily* responsibilities) for even talented beginning teachers to acquire the characteristics of "strong implementation" teachers: that is, to become accomplished professionals. (It is interesting that this particular result is replicated in independent studies of college teachers as well.[9]) But such sustained induction and professional development rarely happen in our school systems. New teachers are unceremoniously dumped into classrooms and left to fend for themselves. Is it any wonder that so many novice teachers fail to develop as hoped for and even leave teaching?

It is not hard to understand why good teaching reduces the gap. What happens in the classroom — both in terms of what the teacher does and of the relationship that is created between the teacher and student — is extremely important. But a disturbing analysis by Kati Haycock, Craig Jerald, and Sandra Huang shows that, in general, black students receive a disproportionate amount of poor teaching.[10] Compared with white eighth-graders, black eighth-graders are twice as likely to have teachers who place little emphasis on developing lab skills, four times as likely to be assessed using hands-on activities once or less per grading period, twice as likely to have a science teacher who does not emphasize development of data-analysis skills, three times as likely to engage in hands-on activities less than twice a month, less likely to have a teacher who participated in professional development the previous year, much less likely to have a certified teacher who has subject competency, four times as likely to have rooms with little or no access to running water or a laboratory, and much less likely to have all the necessary materials.

Compounding this gap in teaching quality is the fact that the impact of teacher expectations is three times as great for blacks as for whites and also larger for girls and for children from low-income families. Interestingly, the ethnicity of the teacher has little effect on student performance: 81% of black females and 62% of black males want to please the teacher more than they do a parent; the comparable figures for whites are 28% for females and 32% for males.[11] In other words, the impact of the teacher is far greater for minority students. Since effective teachers produce as much as six times the learning gains produced by less-effective teach-

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ers,[12] it should not be surprising that good teachers can have such a differentially positive effect on minority students.

The conclusion that good teaching matters will strike many as so obvious as not to be worth stating. And so it should be. But we do not *act* as if it were obvious. If we really thought so, then the continuous professional development of teachers, especially those new to the profession, would head the list of all education reform efforts. What's more, it wouldn't be just any kind of professional development either — and definitely not the kind of scattershot, single-session, workshop-style programs that pass for professional development in so many school districts.

What needs to happen is for school systems to have a *sustained program* of planned professional development for each new teacher that lasts over a period of about 10 years. Such a sustained program should use our best knowledge of what makes students want to learn and should provide new teachers with the kinds of mentoring, training, and feedback that can take them from promising new recruits to the skilled practitioners who can have a transforming effect of students. This outcome cannot be achieved quickly and cheaply.

What would such a long-term professional development program consist of? *How People Learn*, a recent publication of the National Research Council, provides guidelines on what is necessary.[13] In this survey, a group of academics analyzed the research evidence from cognitive science, education, and brain research and found a suggestive convergence of ideas from the three fields. The research evidence is quite clear that three components go into making effective teachers: content knowledge, generic teaching skills, and pedagogical content knowledge.

It is easy to understand the benefits to a teacher of having good content knowledge. It is extremely hard for teachers to teach with flexibility and resourcefulness if they themselves are having difficulty understanding the content they are teaching. Teachers do not have to be content experts, but they do need to have a sufficient level of comfort with the material. I have conducted enough professional development courses to realize that, at least in the mathematics and science areas, many teachers are unprepared, some woefully so. Such teachers tend to take refuge in a mode of teaching dominated by textbooks and lectures, because doing so lessens the chance that students will become engaged, begin to explore new ideas, and so ask questions — thus exposing the teacher's own ignorance. Little learning occurs in such passive classrooms.

A second necessary component of effective teaching is the acquisition of certain generic teaching skills that are conducive to what is known as "active learning" by students: the ability to organize well-structured cooperative-learning classrooms, knowing how to implement hands-on and inquiry-based instruction, knowing what it takes to create conditions for enhancing intrinsic as opposed to extrinsic motivation in students,[14] and the ability to prepare challenging material and to provide support for student success. Teachers should learn how to increase "wait time" in ways that enable students to reflect more thoughtfully on questions. It has been shown, for example, that minority students in integrated classrooms participate more when the wait time is longer. This tactic improves their performance and also changes teacher perceptions. Teachers should also learn the value of providing corrective, neutral feedback to their students — a skill even more valuable than extending wait time. Teachers who practice providing such feedback are less able to predict students' later achievements, which has positive effects on performance, especially for minority students.

The final component — and one that is frequently overlooked — is the need for the teacher to have *pedagogical content knowledge* in the specific subjects being taught. In any subject, students arrive with preconceived knowledge that may conflict with what the instructor is trying to teach. This knowledge is often so deeply buried in the student's mind that he or she may not even be aware of it, but these discipline-specific learning obstacles drive learning nonetheless, and, if teachers do not take them into account, their best efforts can be nullified.

For example, in teaching the subject of electricity, a teacher should be aware that most people believe implicitly and strongly that a battery provides the same amount of current in all situations. I was incredulous when I first heard of this because no science textbook ever teaches such a thing, and it was inconceivable to me how anyone could acquire such an erroneous belief. But many years of teaching electricity to teachers have convinced me that this belief is widespread. Now that I have acquired a greater appreciation of how people learn, it does not seem nearly so preposterous as it did a decade ago. In the course of their everyday lives, people try to make sense of phenomena and build (often unconsciously) mental models that satisfy them. The idea that a battery produces a fixed amount of current does have an empirical basis, and it makes sense to peo-

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ple. If a teacher tries to teach electricity without having his or her students examine the consequences of this hidden and erroneous belief, much of that teaching will be wasted.

The same can be said about any subject, however esoteric. No student is ever a blank slate. They all come with preconceptions, and a teacher needs to learn what the specific preconceptions are for a particular topic and, instead of ignoring them, know how to use these preconceptions to teach students more effectively.

The important point is that all these measures are good for *all* students. The worst thing about much of the current discussion on how to eliminate the achievement gap is that it focuses on what should be done with minority students. This has the effect of making it look as if it is a minority problem.

Such thinking has many unfortunate effects, apart from the fact that discussions of the topic invariably have jarring overtones of patronization and condescension toward the minority community. First, many in the majority community disengage from the discussion, feeling that it is not their problem. Second, the discussion becomes divisive and is frequently framed as a competition for resources, with whatever is given to solve the "minority problem" being that much taken away from teaching white children. Third, seeing the achievement gap as a minority problem breeds the suspicion that attempts to narrow the gap involve trying to "dumb down" the curriculum so that equality is achieved by reaching some sort of lowest common denominator. Finally, the whole enterprise of focusing on the gap as a minority problem tends to ignore the serious matter of the educational underachievement of many white students as well.

We need to create an awareness that the achievement gap is a symptom of more widespread educational problems. We should not treat it as a black problem, with white levels of achievement as the norm. If mathematics performance is any indication, the overall performance of both groups leaves much to be desired. We need to realize that implementing remedies that are good for all can be even better for those who are currently falling behind.

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12. Haycock, Jerald, and Huang, op. cit.

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"I'm all for continuing education. I just wish Dexter hadn't taken up pottery."

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