

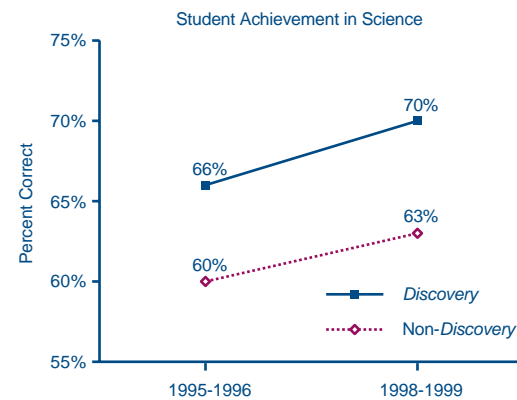
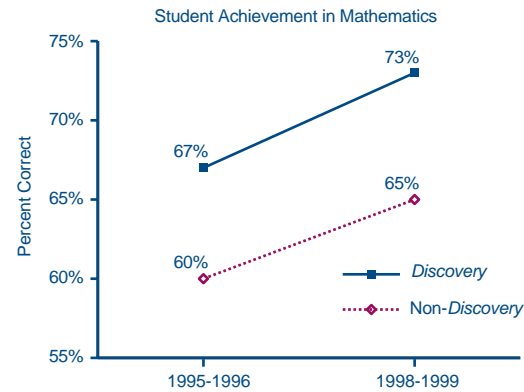
# State Achievement: Is Student Achievement Across Ohio Improving?

## Summary of Key Findings

Beginning in 1991, *Discovery* has provided teachers across Ohio with sustained professional development, based in content and taught by inquiry. Four years after *Discovery* began providing professional development, it started collecting information about teaching practices and student achievement. Since then, over 14,000 students and their teachers have described instructional practices and provided achievement data in science and mathematics. All findings are from *Discovery* and *Non-Discovery* classes in the same schools.

Comparing findings from 1995 and 1996 with those from 1998 and 1999 indicates whether the reform has continued to impact teachers and to enhance student achievement or whether improvement has peaked and leveled off. The graphs below show that although student achievement is improving in Ohio, there is a distinct advantage to being in *Discovery* science and mathematics classes.

Mathematics scores of all seventh- and eighth-grade students in *Discovery* classes increased to 73%, while student scores in *Non-Discovery* classes did not rise above 65%.



Similarly, science scores of all seventh- and eighth-grade students reached 70%, but student scores in *Non-Discovery* classes remained in the low 60s.



Ohio's Systemic Reform of Science and Mathematics Education  
**Discovery**  
Inquiry-Based Learning in the Classroom  
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December 2000

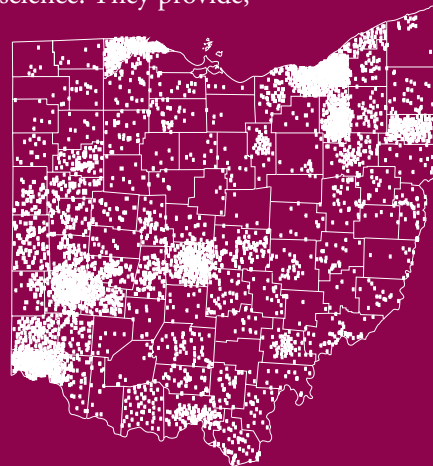
# Ohio's Reform of Mathematics and Science Education

In 1991, Ohio was one of the first ten states to receive funds from the National Science Foundation (NSF) for a Statewide Systemic Initiative in mathematics and science. Ohio's effort—*Discovery*—initially focused on sustained professional development for middle school teachers. Gradually, it expanded its content institutes and curriculum-based workshops to include teachers at all grade levels as well as principals and other administrators.

*Discovery* has used extensive evaluation and research to assess the effectiveness of its programs and to make changes during its decade of reform. In 1996, *Discovery's* efforts expanded to include the preparation of future science and mathematics teachers in Ohio's colleges and universities (Project SUSTAIN) as well as faculty in community colleges and those working in Tech Prep. In 1997, institutes were developed for school principals and other administrators to increase their understanding of the science and mathematics reform. In 1999, *Discovery* refocused its elementary and secondary efforts to address whole schools, called Model schools, to provide leadership training for teams of teachers and administrators who then can expand the reform in local schools and districts. The recent change in grade level from ninth to tenth grade, of the Ohio Proficiency Test, that is required for successful completion of high school, catalyzed *Discovery* to expand its programs for high school teachers in 2000.

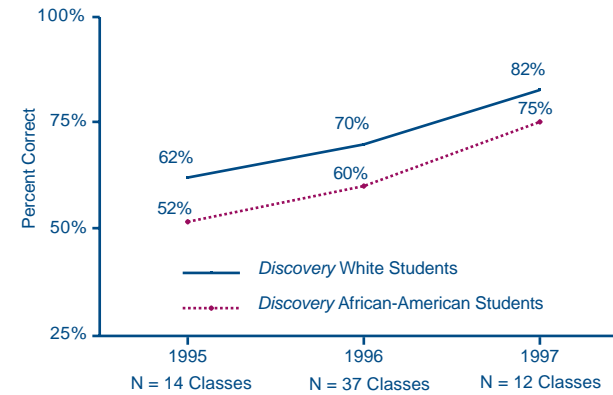
In order for *Discovery* to take the pulse of Ohio's reform in mathematics and science education, it has undertaken five years of extensive research and evaluation. The graphs on the following pages summarize some of its most important findings. Unless otherwise noted, all achievement data are from *Discovery's* Inquiry Tests in Mathematics and Science. Those tests, developed by Ohio mathematicians and scientists, are highly correlated ( $r=.97$  in math and  $r=.98$  in science) with the Ohio Proficiency Test (OPT) in mathematics and science. They provide, therefore, an accurate substitute for OPT data.

Evidence across years indicates that reform efforts have been successful in improving teaching practices and enhancing principal support for change. Most importantly, research findings indicate that students in *Discovery* classes, compared to other students in the same schools, achieve higher on *Discovery's* and Ohio's achievement tests. *Discovery* hopes to reach all teachers and students through its new Model School Effort!

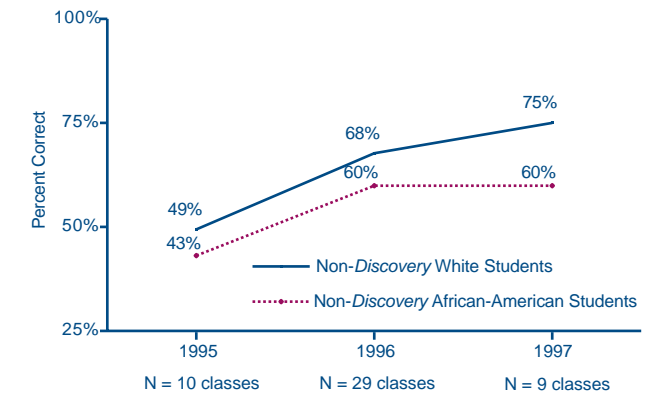


*Discovery's* Professional Development has involved teachers and principal's in every county in Ohio.

# Classroom Achievement: Do Individual *Discovery* Teachers Make a Difference?



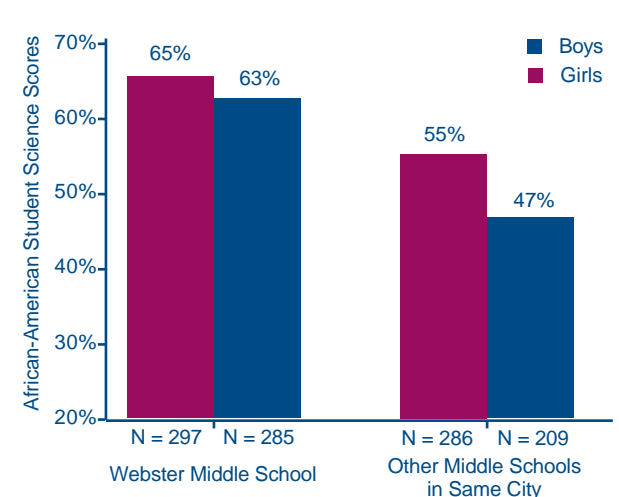
One goal of Ohio's educational reform is to narrow achievement gaps between groups of students, while raising the scores of all students. Both African-American and White students in *Discovery* mathematics classrooms (left) outscore those in *Non-Discovery* classes (right).



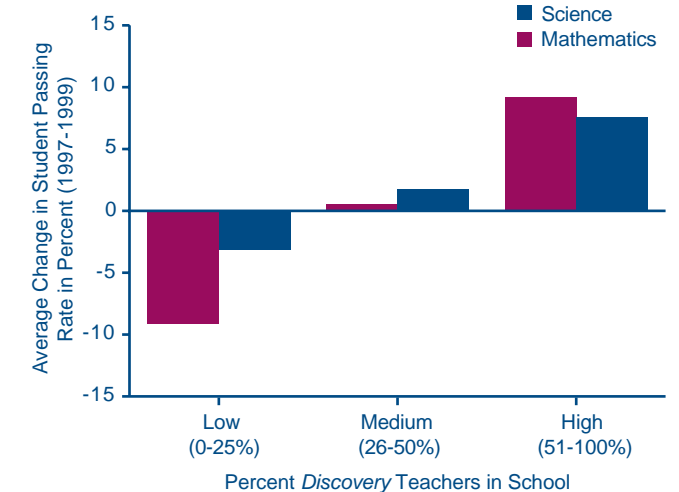
Further, the achievement gap between African-American and White students has narrowed in *Discovery* mathematics classes, while it has widened in *Non-Discovery* classrooms.

# School Achievement: Does the Number of *Discovery* Teachers Matter?

In 2000, *Discovery* shifted its emphasis from individual teachers to whole school reform. This shift was based on findings showing that a critical mass of *Discovery* teachers, a concerned and knowledgeable principal, and strong community support enhance student achievement.



All science and mathematics teachers at Webster Middle School have participated in *Discovery*. Students at Webster outperform science students at all other middle schools in its urban district.



Likewise, improvement of student passing rates on the Ohio Proficiency Tests in science and mathematics increase as the percentage of *Discovery* teachers in a school increases.