



ADVANCING EXCELLENCE IN SCIENCE TEACHING AND LEARNING

**THE MERCK INSTITUTE FOR SCIENCE EDUCATION**

**A**t Merck, we are deeply committed to making a difference in people's lives by helping them be well. We do this by working to discover and develop innovative medicines and vaccines to help improve health and well-being around the world.

Achieving our mission depends on our ability to tap into the best scientific minds and harness new ways of thinking. That is why we believe that fostering the next generation of scientists is so important – not only for Merck, but for the future of global health.

In 1993, Merck took an industry-leading step to establish the Merck Institute for Science Education (MISE) to improve science education in public schools. For more than 15 years, MISE has collaborated with teachers and administrators in 70 schools in New Jersey and Pennsylvania to achieve sustained improvement in how students experience science, and how well they perform.

This effort has been recognized as a success by educators and lawmakers alike, and demonstrates that partnerships like MISE can be a powerful model for improving public education. I am particularly proud of the fact that the MISE leadership team was invited by the Obama Administration to participate in a roundtable on improving student achievement in mathematics and science.

Merck has made a long-term commitment to science education, not only through MISE – which extends from kindergarten through high school – but also through other programs and partnerships that support higher education. We believe that igniting the spark of scientific excitement and understanding among students, particularly our youngest, can have a life-long impact.

Our hope is that programs like MISE will lead students to a permanent interest in the sciences, and help expand the pool of future scientific leaders – paving the way not only for advances in health care, but also for a country that is better prepared to thrive in an increasingly global economy.

Sincerely,



Richard T. Clark  
Chairman and Chief Executive Officer  
Merck & Co., Inc.

*“We believe that igniting  
the spark of scientific excitement and  
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—Richard T. Clark

The Merck Institute for Science Education (MISE) was established so that every child, regardless of background or ability, could have access to a high-quality science education. The work of MISE has focused on one of the most direct roads to achieving this goal, equipping teachers and administrators with the knowledge and tools to help them to teach science effectively and engage their students for a lifetime of learning science.

Our work has largely focused on creating opportunities for professional development in partnership with local school districts. These partnerships provide a unique working relationship, one that allows us to plan in collaboration with local educators, ensuring that the support we offer is relevant and meets their specific needs. This professional development supports educators as they increase their knowledge and understanding of science content, as well as effective strategies to help them to teach science well.

One of the reasons our work has had a significant impact is our focus on *building capacity* in our partner districts. MISE's professional development is often led by a team of educators, pairing accomplished teachers, knowledgeable about content and adult learning, with those whose expertise is growing. This supports our partner districts' abilities to provide professional development; it also increases opportunities for educators to share their knowledge with their peers, becoming leaders and lifelong learners in the process.

It is a great honor to have been at the helm of this organization since its inception. Working closely with educators has afforded me the opportunity to lead an organization that supports teachers and administrators as they create rich and rewarding learning environments for their students. I invite you to learn more about MISE in the pages that follow, and I hope that you share our enthusiasm about the impact and excitement of the work that we do.

Sincerely,



Carlo Parravano, Ph.D.  
Executive Director  
Merck Institute for Science Education





### THE MISE MISSION

The mission of the Merck Institute for Science Education is to improve the teaching and learning of science, with the ultimate goal of improving all students' performance and participation in science.



From its inception, MISE has sought to support the capacity of school districts to create and sustain innovative classroom practice. The Institute's best practices have been cited in the National Research Council's influential 2006 report, "Rising Above the Gathering Storm," and in "Innovation America – Building a Science, Technology, Engineering and Math Agenda," published by the National Governors Association in 2007.

The theory behind the work of MISE rests on **eight building blocks** designed to guide and support improvement in science instruction throughout a district. These eight core elements are based on the premise that the best path to ensure every child access to high-quality science instruction is through deliberate and sustained efforts to improve teaching and learning in all science classrooms:

1. Improving science teaching and learning requires building and supporting strong **communities of educators** within and across schools.
2. A district must select **accomplished teachers** who can lead, coach and model good practice.
3. Teachers must be supported by **highly-skilled principals** who practice **collaborative leadership**.
4. Principals, teachers and school staff need regular access to **high-quality professional development** so that they continuously improve their practice.
5. Professional development must establish a culture of **evidence-based practice**, modeling the use of data to make decisions and preparing teachers and administrators to adopt this approach.
6. Principals and teachers should have access to **tools and strategies** that have been used effectively in other schools and districts.
7. Effective implementation requires **district focus and coherence**, with sufficient resources and time allotted to encourage continuous participation in professional development.
8. The district and MISE **planning together for the work** develops commitment, builds understanding, and helps generate public support.



*"My students are now  
thinking like scientists, expressing opinions  
and learning through discovery."*

—Christine Hoch, 8<sup>th</sup> grade science teacher,  
Pennfield Middle School, North Penn School District (PA)



## Powerful Professional Development

Since its founding in 1993, The Merck Institute for Science Education (MISE) has collaborated with more than 6,000 educators to make science a priority in schools and districts and cultivate lasting improvements in science teaching and learning. Each year, MISE works with hundreds of K-12 teachers, principals and district administrators through a host of professional development programs.

The Institute's newest and most ambitious program, **The Academy for Leadership in Science Instruction** (the Academy), builds upon more than 16 years of MISE's successful work, incorporating the latest research in teaching and learning. The Academy is a three-year professional development program for teachers, principals and district administrators who work together to deepen their understanding of the fundamentals of leadership and strong classroom science instruction. Through the work of the Academy, school districts develop their capacity to support instructional improvement in science, resulting in increased student participation and performance in science.

School-based teams that participate in the Academy have access to a professional development curriculum designed by a team of educators, scientists, staff developers and education researchers,

many of whom are also Academy instructors. Academy participants examine research around effective science instruction and engage in scientific investigations in order to analyze student and teacher learning. To support their leadership work, teams study and practice methods of effective collaboration, examine compelling communications strategies, and reach out to their colleagues to create a shared vision of leadership in science.

**Peer Teacher Workshops** are the longest-running and farthest-reaching of MISE programs. These week-long professional development sessions are designed to deepen teachers' content knowledge and understanding of key concepts in their science curricula, preparing them to successfully engage in inquiry-based science instruction. Teacher leaders who plan and facilitate the Peer Teacher Workshops are prepared through the MISE Professional Development Design Workshops.

In addition to its activities within the United States, MISE has worked internationally to improve student performance in science. Through its support of the IN-STEP program in tsunami-ravaged Thailand, MISE provided professional development for teachers in 80 Thai schools, established a central science resource center and created a model for replication.

*“This is more than just a science initiative.  
It’s an educational initiative – it’s about changing the way we teach.”*

—Lee McCaskill, Principal, Hillside High School, Hillside Public Schools (NJ)





## Powerful Partnerships

### Teachers, Principals and Administrators

The work of MISE stems from the conviction that the involvement of teachers, principals and district administrators is vital to sustained improvement in science education. MISE works in close collaboration with these partners to foster shared knowledge and leadership. MISE makes professional development available both inside and outside the classroom, supporting teachers in building content knowledge and powerful teaching strategies, and preparing them to become leaders of professional development themselves. At the same time, MISE works with teachers and district administrators to select the best curriculum materials, develop the most effective assessment tools, and provide sustained support for teachers and students.

### Policymakers

MISE takes a proactive approach to informing policies that support science education at the local, state and national levels. Locally, MISE collaborates with school districts to support best practices that are aligned with state standards. At the state level, MISE has actively participated in the development of New Jersey's Science Core Curriculum Content Standards. Nationally, MISE partners with leading education organizations, advocates for stronger public-private partnerships, and shares the MISE approach with universities, corporations, foundations, school districts and informal science centers.

### Employees

Merck employees support MISE's work by volunteering in schools and providing exposure to real-world applications

of science, as well as encouraging mentor relationships that can help students realize their full potential. Employees also support local teachers by serving as classroom volunteers and as science content resources for teachers. MISE-designed Family Science Days at Merck facilities and within partner school districts provide opportunities for parents and students to learn science together, often with the guidance of Merck employees.

### Higher Education Institutions

While its work is primarily focused on K-12 education, MISE also supports science learning beyond high school through two key programs. **The UNCF / Merck Science Initiative** seeks to increase the number of African-American scientists by supporting outstanding undergraduate, graduate and postdoctoral students in the biological and chemical sciences through scholarships, fellowships and internships. **The Alliance / Merck Ciencia (Science) Hispanic Scholars Program** was established in 2008 in partnership with the National Alliance for Hispanic Health to promote Hispanic student access to higher education in science, technology, engineering and mathematics.

### Partnerships for the Future

Working with teachers, administrators, parents, volunteers, and policymakers, the Merck Institute for Science Education has moved towards achieving the goal of providing effective science instruction for every student. MISE will continue to build local, state and national partnerships to improve student performance and participation in science until high-quality science education is indeed the standard for all children.

*"We all have a vision of  
what we want our schools to be.  
But you can't just think about it.  
You have to act."*

—Kristin Higgins, Principal,  
Three Bridges Elementary School, Readington Township Public Schools (NJ)



# MERCK INSTITUTE FOR SCIENCE EDUCATION

- 2011 • MISE celebrates the first graduating class of the Academy for Leadership in Science Instruction.
- 2008 • MISE inaugurates The Academy for Leadership in Science Instruction.
- 2007 • *Ready, Set, SCIENCE!* is published by the National Academies Press with support from MISE. The book makes the latest science education research accessible to educators and wins the Association of Educational Publishers 2008 *Distinguished Achievement Award*.
- 2006 • The IN-STEP program commences in Phang-Na, Thailand.
- 2005 • The MISE portfolio expands to higher education with the addition of the UNCF/Merck Science Initiative and the Merck/AAAS Undergraduate Science Research Program. MISE launches the NAHH/Merck *Ciencia* Scholars Program in 2008.
- 2003 • MISE introduces the In-Class Support Coaching Program.
- 2002 • The National Science Teachers Association recognizes MISE for “leadership in enhancing professional development for science teachers.”
- 2001 • MISE is honored with the Ron Brown Award for Corporate Leadership from the White House.
- 1999 • MISE publishes *An Assessment Sampler*, drawing from the work of teachers in partnership districts.
- 1996 • The National Science Foundation awards MISE a five-year grant; a second grant follows in 2003. MISE establishes the Peer Teacher Workshops and Principals’ Institute.
- 1995 • MISE launches the Leader Teacher Institute to deepen teachers’ content knowledge and leadership capacity.
- 1994 • MISE partners with the University of Pennsylvania to initiate the Penn-Merck Collaborative for the Enhancement of Science Education and the Merck Fellows Program.
- 1993 • MISE is established with a ten-year commitment from Merck & Co., Inc. MISE opens its first Resource Center in Rahway, NJ, housing best-in-kind science instructional materials.



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