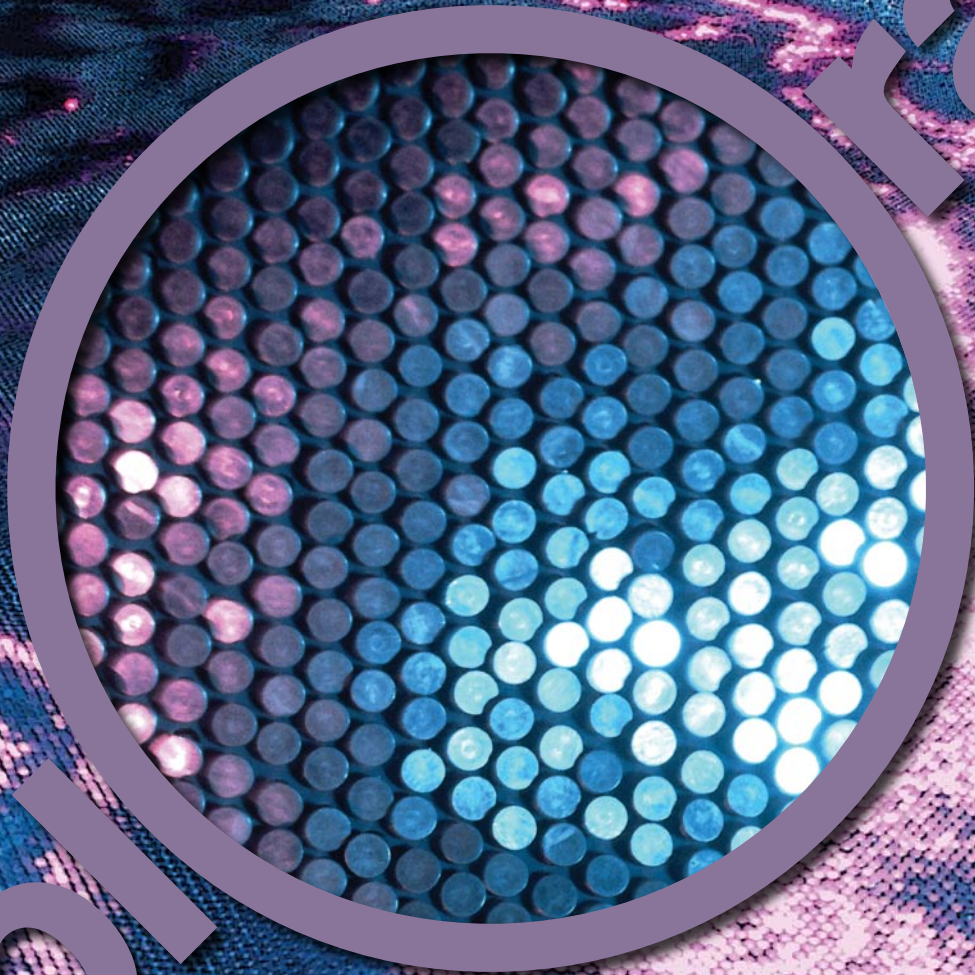


exploratorium



more than a museum—a learning laboratory

www.exploratorium.edu

exploratorium®
the museum of science,
art and human perception

(About the cover) Have you ever tossed a handful of pebbles into a sunlit pond and caught an eyeeful of sparkling reflections? In the Exploratorium exhibit, Vibrating Pinscreen, undulating ripples move through 170,000 hanging pins instead of water, yet the dynamics are much the same. Vibrations travel and overlap, combining in some places, canceling in others, creating sinuous patterns that spread across the silvery surface.

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Susan Schwartzberg, and Amy Snyder



The Exploratorium is typically perceived as a science museum. In reality, it is a place that experiments with new practices for discovering the world; a museum filled with interactive science and art exhibits; a national center for teacher development; an award-winning Web site of new teaching resources; and a growing global network of partner museums. Fundamentally, it is a laboratory for the research and development of innovations in exhibits, Web publishing, and programs, linked to a worldwide dissemination network.

Its mission is to nurture curiosity in the world around us. Its audience is as broad and eclectic as that found on a public beach. Located in San Francisco and headed by Dr. Dennis M. Bartels, a nationally known science education and policy expert, the Exploratorium has extended its philosophy of learning beyond the museum's doors, sharing its resources nationally and internationally with any who wish to take advantage of, or replicate, this innovative approach to exploring science, art, and human perception.

The *Encyclopaedia Britannica* has described the Exploratorium as "the archetype of the experiential, 'hands-on' science center." *Scientific American* calls it "the best science museum in the world," and, at an international meeting of museum leaders in 2005, it was voted as such. More than half a million visitors, including 130,000 students and teachers on school field trips, come to the Exploratorium each year. The Web site, at www.exploratorium.edu, receives more than 27 million distinct visits annually, and more than 20 million people see Exploratorium-designed exhibits displayed at science centers around the world.

**the
exploratorium
is many
things**

Exhibits and Collections Developed in-house with extensive research and evaluation, more than 650 Exploratorium exhibits have been designed to spark curiosity, regardless of age or familiarity with science. Recent exhibitions have been part of a ten-year effort to strengthen core collections in areas including human perception, life sciences, and physical phenomena. *Traits of Life* examines fundamental elements common to all living things. It includes the Microscope Imaging Station, where visitors use research microscopes to view biomedically relevant organisms and tissues. Here, audiences examine live images to explore a fish's embryonic development or the tiny worms used to study Alzheimer's disease. *Seeing* lets visitors play with light, color, and the way we interpret our surroundings, and the *Seeing Gallery* presents revolving art exhibitions exploring different approaches to visual information. The *Matter World* collection focuses on the physical sciences, including heat and temperature, electricity and magnetism, motion, feedback, and weather. *Listening* gives a new understanding of sound and how we perceive it. *Mind*, opening in 2007, will help visitors investigate the way we think, feel, and make decisions. *Outdoor Exploratorium*, due to be completed in the spring of 2008, is a collection of outdoor exhibits dispersed at partner sites around the San Francisco waterfront. Core collections also feature live demonstrations and artist-in-residence projects.

Public Programs Public Programs animate the museum with innovative events, activities, experiences, and exposure to fresh ideas. They complement exhibits and address current issues and divergent perspectives. Programs include original plays, films, craft demonstrations, artist projects, and lectures. In the summer of 2006 the museum offered *NanoScape*, five weeks of events on discoveries and opportunities in nanotechnology, including a community building experience. *Magnitude X* was a month-long commemoration of the 1906 earthquake and the first trilingual event (English, Spanish, Chinese) in the museum's history. For example, in spring 2007, we launched an art exhibition titled *Liminality: Art on the Threshold* that projects images as high as 45 feet both in the museum space and in the Rotunda. Through this experimental project, visitors become aware of

**exhibits
and artworks
designed,
prototyped,
and built
on-site**



Using hands-on exhibits, visitors explore science, art, and natural phenomena in surprising and unexpected ways.

the vertical space above them and the architectural details of the Palace of Fine Arts itself. On display from March 8 through June 3, 2007, this three-month art exhibition builds on a rich history of boundary and perception-bending art projects that play with our architecture.

Arts Artists are essential partners in shaping the Exploratorium's distinctive approach to creative learning. When the museum was founded in 1969, the inclusion of art in a science museum was a pioneering concept. Today, the Exploratorium's commitment to new ideas, new technologies, and new ways of looking at the world continues to benefit from the close collaborations of artists, scientists, and educators.

Staff artists work as teachers, program directors, and exhibit designers. The artist-in-residence program, established in 1973, has hosted hundreds of sculptors, composers, dancers, poets, media artists, and filmmakers. Artists in residence work alongside physicists, biologists,



Exploratorium Explainers, ranging in age from 14 to 19 years old, answer questions, give directions, and perform hands-on demonstrations such as this cow's eye dissection.

ecologists, and teachers to create new exhibits, develop education programs, and design Web projects. In addition, a lively program of temporary exhibitions, performances, and film screenings brings playful and often challenging contemporary art to diverse audiences, while also helping the Exploratorium connect with communities locally, internationally, and on-line.

Traveling Exhibitions Several Exploratorium exhibitions are in circulation, rented by other institutions. *Memory*, which explores how humans process, store, retrieve, and forget memories, will travel to a total of 21 sites through 2008. *Navigation* explores the diversity and ingenuity of human navigation methods and has gone to 23 venues since 1993. A version of *Traits of Life* will visit nine cities by the end of 2007.

Partner Museums ExNET (Exploratorium Network for Exhibit-based Teaching), a partnership of the Exploratorium and eight other museums from Sarasota to San Diego, makes it possible to lease the Exploratorium's most popular exhibits for three years at a reasonable cost. Each partner receives 30 to 35 thematically linked exhibits annually, plus educational expertise and support from the Exploratorium. The network forges alliances among partners and creates new funding, research, and collaborative opportunities for them. ExNET even spawned

**partner
museums:
where in the
world are
our exhibits?**

a subnetwork of four small, rural museums in Texas, called “TexNET,” that share exhibits and resources.

Teacher Institute (TI) TI has been a professional development center for middle and high school science and math teachers for more than 20 years. In 1998, in response to skyrocketing numbers of new teachers in local school districts, TI created the first science-specific teacher-induction program in the country, which is the subject of national research studies. Each year 35 new teachers join the TI community of over 2,700 experienced science teachers who are committed to inquiry-based science in the classroom and their own continuing professional development. Because each middle and high school teacher interacts daily with an average of 150 students, TI potentially impacts over 400,000 students annually. Through workshops, mentoring by experienced TI alumni, Internet-based resources, and classroom coaching, the program improves the classroom effectiveness and retention rates for new teachers all around the country. In response to requests for assistance with meeting the new “No Child Left Behind” (NCLB) requirement—that teachers pass the California Subject Examinations for Teachers (CSET)—the Exploratorium launched its pioneering NCLB Teacher Quality Program in September 2005. Now TI is developing *Teacher*

**teaching
science:
professional
development
and research**



Through the Teacher Institute and Institute for Inquiry, educators rediscover the pure joy of learning while developing new classroom activities and teaching tools.

Institute Online to meet the professional development needs of science teachers in areas distant from the Exploratorium, building the foundation for a new national audience of distance learners through the creation of online tools that can be used to maintain the nationwide TI community.

Institute for Inquiry (IFI) Since 1995, IFI has worked with more than 4,500 elementary science educators from 850 school districts in 39 states, potentially reaching more than two million students annually. IFI provides participants with the tools to introduce inquiry-based methods of teaching, a central element of the National Science Education Standards. IFI offers workshops for professional developers, teachers, university professors, graduate students and out-of-school leaders, while providing on-line resources, publications, and an intellectual community of practice. IFI recently launched a new Web site that features on-line professional development modules that are available worldwide and at no cost to teachers.

Center for Informal Learning and Schools (CILS) CILS conducts research, hosts symposia, and leads professional development programs related to strengthening the informal science education infrastructure. Its aim is to help informal science play a stronger role in expanding student participation in science fields. Through partnerships with the University of California Santa Cruz and King's College London, CILS has prepared more than a dozen post-doctoral researchers (now primarily in academic positions) and about two dozen graduate students in education and developmental psychology to work in the domain of informal science learning. CILS has conducted more than 25 research projects ranging from large-scale national studies of program designs to in-depth observational studies of learning in informal settings. It is currently serving as the Research & Evaluation Center for the National Science Foundation's Academies for Young Scientists.

Explainers Since the Exploratorium opened its doors in 1969, more than 3,500 Bay Area 14- to 19-year-olds have worked as orange-vested Explainers, the Exploratorium's principal floor staff. Explainers answer visitor questions and are responsible for presenting several phenomenon-based public demonstrations

**youth
programs**



Outreach workshops in schools and neighborhood centers give young people the chance to make their own experiments and mini-exhibits.

throughout the day. Through this challenging first job experience, Explainers gain an enthusiasm for knowledge and communication skills that serves them throughout their personal and professional lives. This program serves as a model for museums around the world seeking to develop effective youth programs. Explainers have opportunities to stay on after their tenure is complete and work in other museum departments, such as Outreach.

Children's Educational Outreach Created in 1985, Outreach collaborates with local community groups and social service organizations to provide Exploratorium curriculum to inner-city youth and their families. Activities include science and art projects at neighborhood sites, intensive five-week summer classes for middle school students, and family science nights during the school year. More than 5,000 people are served annually, and all activities are free. Outreach has now entered a new phase of capacity-building by providing professional development for educators and leaders in the after-school field, both locally and at the state and national levels, and by developing and implementing technology-based curriculum for middle school students and the educators who work with them in after-school environments. This year Outreach is piloting XTech, an exciting new collaboration with several community-based organizations enabling 100 under-

served students—particularly minorities and females—to develop their STEM (science, technology, engineering, and math) capabilities through an innovative Exploratorium-designed curriculum using Lego robotics and digital imaging.

Web Site On line since 1993 at www.exploratorium.edu, the Exploratorium was one of the first museums to build a site on the World Wide Web. Now containing more than 22,000 Web pages exploring hundreds of different topics, the site receives 27 million distinct visits a year—making it one of the most visited museum Web sites in the world.

The site focuses on science, and diverse topics include skateboarding, earthquakes, and remembrances about the bombing of Nagasaki. The site offers a wealth of activities, such as online interactive exhibits, activities for teachers to use in the classroom, and ideas for do-at-home experiments. Projects include the *Accidental Scientist* (cooking, music, and gardening), which engages visitors in the science of everyday activities; and *Faultline: Seismic Science at the Epicenter*, which provides current data and information about the science behind earthquakes, and experts' attempts to predict and prepare for them.

media and communications



From solar eclipses to Mars explorers, Webcasts from the Wattis Studio bring real-time coverage of the latest research to millions worldwide.



Interactive exhibits, displays, and artworks engage visitors no matter what their age or familiarity with science.

Webcasts Live and archived Webcasts from locations all over the world, including firsthand visits to Antarctica, advance public understanding of current science research. With topics ranging from solar eclipses and the science of opera singing to the Iron Science Teacher Webcasts (a science demonstration competition for educators), the museum produces 30 to 50 Webcasts each year, all archived at www.exploratorium.edu/webcasts.

Publications The museum produces books, posters, kits, and other learning tools for families, educators, and the public. Currently we have 36 titles in print. *Exploratoria*, a new 373-page, children's reference book, was published in late 2006 by Little, Brown. This compendium of Exploratorium hands-on content and inquiry-based investigation serves as inspiration for young people and their families alike. Woven throughout the 21 chapters are "Tools for Exploration," which help young people develop the creative problem-solving skills used by scientists as they investigate the world around them. *Exploratoria* has a companion Web site that points users to related content sites. Other releases include the *Math Explorer*, a book of entertaining math activities for afterschool programs; *Square Wheels*, an activity book for teachers featuring classroom versions of Exploratorium exhibits; and *Math and Science Across Cultures*, a book delving into everyday activities of cultures around the world.



In a mesmerizing exhibit, Icy Bodies, by Shawn Lani, dry ice twirls in water like comets move through space.

Listed here is a sampling of distinguished people in art, science, and education who have contributed to making the Exploratorium the vibrant place it is today. The Osher Fellows Program supports residencies for outstanding scholars and practitioners at the Exploratorium. Fellows are shown in italics.

**scholars,
scientists,
educators, and
artists**

Distinguished Collaborators

Authors/Educators

Paul Black
K. C. Cole
Hubert Dyasi
Howard Gardner
Louis Gomez
Wynne Harlen
Jan Hawkins
Lewis Hyde
Eric Jolly
Evelyn Fox Keller
Sara Lawrence-Lightfoot
Jim Minstrell
Jon Ogborn
Jonathan Osborne
Richard Rhodes
Barbara Rogoff
Michael Spock
Bob Tinker
Peter Zander

Artists

Dennis Adams
Laurie Anderson
Ruth Asawa
Mowry Baden
Michael Brown
John Cage
Jim Campbell
Wendy Clarke
Joe Cusumano
Paul DeMarinis
Brian Eno
Ward Fleming

Arthur Ganson
Guillermo Gómez-Peña
Joanna Haigood
Douglas Hollis
Tim Hunkin
Toshio Iwai
Rhodesa Jones
Eduardo Kac
Ned Kahn
Paul Kaiser
Walter Kitundu
Gerald Marks
Bob Miller
Morgan O'Hara
Bob Ostertag
Jim Pomeroy
Rosamond Wolff Purcell
Seth and Noah Riskin
Gustavo Rivera
Muriel Ruckeyser
John Sanborn
Bruce Shapiro
Scott Snibbe
Trimpin
Mierle Laderman Ukeles
Camille Utterbach
Bill Viola
Diane Willow
Fred Wilson

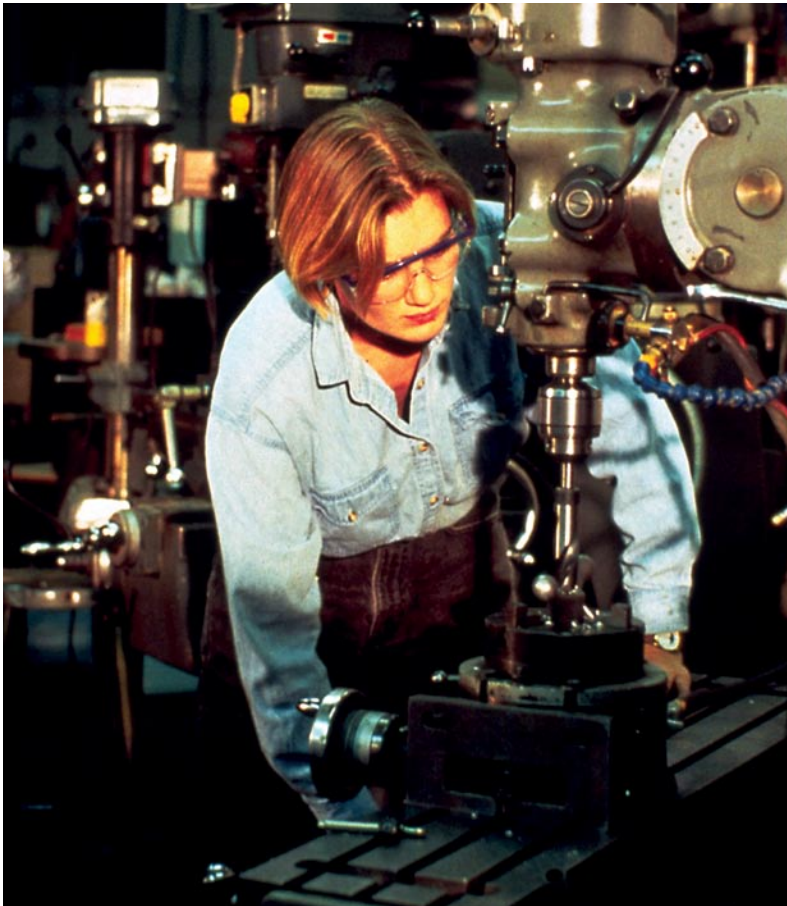
Scientists

Joont Allen
Jeanne Bamberger
Anders Barany

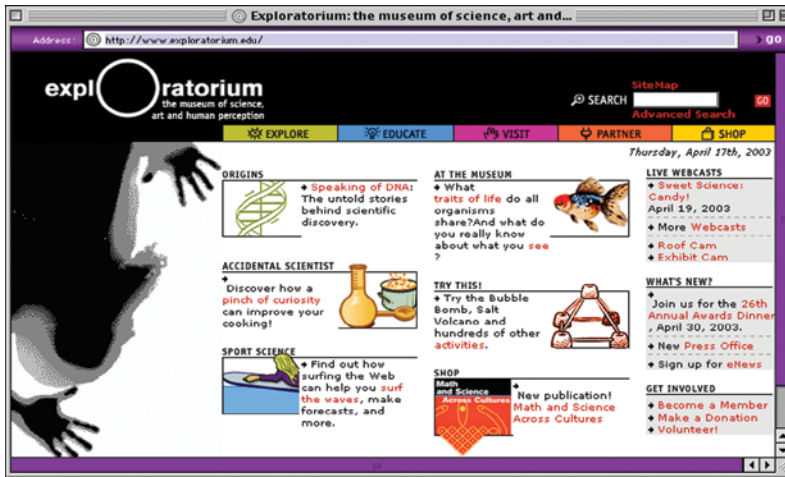
Elizabeth Blackburn
Ken Brecher
Bruce Conklin
James Crutchfield
Michael Glantz
Ursula Goodenough
Allison Gopnik
Richard Gregory
Edward T. Hall
George Hein
Daniel Kahneman
Christof Koch
Leon Lederman
Elizabeth Loftus
Roger Malina
Benoit Mandelbrot
Jonathan Miller
Philip & Phylis Morrison
Sidney Nagel
Douglass Osheroff
Svante Paabo
Dennis Purcel
V. S. Ramachandran
Mitchel Resnick
Hillary Rose
Steven Rose
Oliver Sacks
Jonathan Schooler
Judah Schwartz
Arthur Shimamura
Steven Vogel
James Watson
E. O. Wilson
Kristina Hooper Woolsey

Exploratorium exhibitions have been recognized with Awards for Excellence from the American Association of Museums (AAM). *Revealing Bodies* (2000 winner) traced imaging of the body through history and revealed it to be a fusion of science, art, nature, and culture, rather than a depiction of a straightforward anatomy. *Memory* (Honorable Mention, 1998) guided visitors through the labyrinth of memory from personal, social, cultural, psychological, and neurological perspectives. *Boundaries* (1997 winner) explored the universal phenomenon of boundaries as both an intellectual idea and a visceral experience. These awards represent the

exploratorium honors



The vibrant, sprawling landscape of sights, sounds, and curiosities is designed, prototyped, and built on site at the Exploratorium.



The award-winning Web site offers more than 22,000 pages of information and activities.

highest recognition in the museum field, selected by experts from the national museum community.

The Exploratorium Web site has received Webby Awards for Best Science Site (2004, 1999, 1998, and 1997). In 2002, the site received the Webby Award for Best Education Site and, in 2000, the Award for Innovation from the Association of Science-Technology Centers for worldwide leadership in Internet-based education. In 2002, it was honored with the Pirelli INTERNETional Award for multimedia publishing with an environmental subject for the Global Climate Change Web site. In 2005, the Exploratorium Web project, *Saturn: Jewel of the Solar System*, received the Scientific American Science and Technology Award in astronomy, and the *Science of Gardening* was selected for a 2006 MUSE Award from the AAM.

For more than a decade, the Exploratorium has led the museum world in support from the National Science Foundation (NSF). Currently, the museum receives funding from 18 NSF grants that support a broad range of exhibit development, education, and research.



Today, visitors to museums and science centers in 29 countries enjoy Exploratorium exhibits.

Support The Exploratorium is a not-for-profit organization that supports its work through donations, sponsorships, partnerships, fees for service, and the participation of 10,000 members and an international team of 250 volunteers. Founded in 1969 by physicist Frank Oppenheimer with a \$50,000 grant from a local foundation, the museum currently has an annual operating budget of \$28 million and has 375 employees. Your participation is welcomed!

join us

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Strategic Alliances and Partnerships

Aim High	Massachusetts Institute of Technology (MIT) Media Lab
American Association for the Advancement of Science	NASA - Sun Earth Connection Education Forum
Association of Science Technology Centers (ASTC)	NASA/JPL - Museum Alliance
Boston Museum of Science	National AfterSchool Association
Boys and Girls Clubs	Omniplex Science Museum
California School Age Consortium (CalSAC)	Project Read San Francisco
Children's Hospital Oakland	Rainbow Seventh Day Adventist Church
Children's Aid Society	Reuben H. Fleet Science Center
Coalition for Science After School	Rochester Museum and Science Center
Discovery Center of Springfield	San Francisco Department of Children, Youth and Their Families (DCYF)
Fort Worth Museum of Science and History	San Francisco Unified School District (SFUSD)
Fresno Metropolitan Museum	Science Museum of Minnesota
G.WIZ, the Hands-On Science Museum	Society for Hispanic Professional Engineers
Girl Scouts of San Francisco Bay Area	Technical Education Research Centers (TERC)
Home Instructional Program for Preschool Youngsters (HIPPY)	The After-School Corporation (TASC)
King's College London	University of California, Santa Cruz
Lawrence Hall of Science	University of California, San Francisco (UCSF) Pediatrics Schoolroom
Los Angeles Unified School District and California Science Center	YMCA
Mathematics Engineering Science Achievement (MESA)	

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"Best science museum in the world."

—Dennis Flanagan
Editor Emeritus, *Scientific American*

"The reason Silicon Valley has spawned so much creativity is because all these creative folks went to the Exploratorium when they were young."

—Brian Eno, renowned artist,
musician, cultural thinker

"Thank you so very much for your insightful presentation on the induction of mathematics and science teachers. Now, it is an integral part of [the Commission's] vocabulary in thinking about a new professionalism for math and science teachers."

—The National Commission on Mathematics
and Science Teaching for the 21st Century

"The exhibits in the Exploratorium are the result of the creative collaboration between scientists and artists, and they reveal the essential connection between the principles of nature and beauty. The Exploratorium is the best confluence of science, technology, and art, and the coolest place to be since the Italian Renaissance in fifteenth-century Florence!"

—Bill Viola, Artist

"Ten Great Science Museums: In San Francisco, the Exploratorium."

—*Discover* magazine

"There are two models for great American amusement centers and both can be found in California. Rising from the plains of Anaheim is the original Magic Kingdom, Disneyland. To the north, in a hangar-size building at the foot of the Golden Gate Bridge, is the Exploratorium."

—*Newsweek*

"Exploratorium influences science museums new and old."

—*Physics Today* magazine

"Best science museum Web site."

—Yahoo! Internet Life

"No one in recent years has had a greater impact upon museums."

—American Association of Museums Award

"Among my favorites on this year's undiscovered list is the Exploratorium, a great museum both in person and online."

—*PC Magazine*

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