ASTC Dimensions

Bimonthly News Journal of the Association of Science-Technology Centers

January/February 2004

Science Centers as Schools: Extending the Mission

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This journal often looks at ways that science centers serve schools or foster relationships between museum educators and classroom teachers. But some ASTC members take it a step further. They bring school into the museum, setting up classrooms, opening their collections, collaborating in curriculum design—turning curiosity and exploration into a lifetime of inquiry and discovery. "Can we grow naturalists?" wondered the museum educators who helped start one museum-based school. "Are we really earning our identity as educational institutions?" asks a director who shares his museum with another. Read on, and decide for yourself.

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Cover: *Clockwise from top left, first graders at Genesee Community Charter School sketch a frog from life; young engineers practice their construction skills at Chrysalis Charter School; Ontario Science School students explore the wetlands near the science center.* Photos courtesy Rochester Museum & Science Center, Chrysalis Charter School/Turtle Bay Museum, and Ontario Science Centre.

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ASTC-member institutions receive five free copies of each issue as a benefit of membership. Individual and bulk subscriptions are also available. For employees of ASTC-member institutions, the individual rate is U.S. $30; $40 outside the United States. For all others, the price is $45; $55 outside the United States. Send name, address, name of institution, and payment in U.S. dollars to ASTC, 1025 Vermont Avenue NW, Suite 500, Washington, DC 20005-6310, U.S.A., Attn: ASTC Dimensions. For more information or to place a credit-card order, contact publications assistant Shirley Gaines, 202/783-7200 x140; e-mail pubs@astc.org. ALTERNATIVE FORMATS AVAILABLE ON REQUEST.

Earning Our Identity:

Are We Being True to Our Educational Core?

By David E. Chesebrough

Parents and children pack the Ecosystems & Adaptations lab during a family program at the Buffalo Museum of Science. *Photo courtesy Buffalo Museum of Science*

When the Buffalo Museum of Science celebrated its 140th anniversary in December 2001, we invited our "museum kids"—people who had made the institution a second home in childhood—to hold an on-site reunion. More than 120 showed up.

During the program, the museum kids asked to come up to the podium. I listened in amazement as one after another shared memories (some dating as far back as 1925) and offered testimonials. Over the years, a regular program of free Saturday activities had provided the foundation for these local youth to go on to college careers—many as the first in their families to do so.

Among the group were an internationally known paleontologist, a prominent computer scientist, and several museum directors, as well as doctors, scientists, teachers, and architects. What stood out most as they spoke was how vividly they remembered being able not only to pursue their interests but also to socialize within the richness of the museum. (Several even grew up and married one another.)

One recalled the program as "an incredible opportunity to know others of different cultural, religious, socioeconomic, and educational backgrounds," while another, now a physician, spoke for many when she said, "In addition to my family, the museum was the biggest influence on my life and the person I became personally and professionally."

Can museums still play such a significant a role in children's lives? Can we still inspire and support that kind of personal learning? Or do today's budget restraints and competition for visitors' time mean we must settle for the kinds of impact possible during occasional field trips and family outings?

I believe that museums can, and must, find ways to take full advantage of our special educational assets—that we must engage our visitors in a partnership for lifelong learning. How else can we justify our existence, and our need for support, to communities already strapped for funds? At the Buffalo Museum of Science, this mission is expressed in a long-term relationship with and commitment to schools, and to the community at large.

Making science a magnet

Many of the programs and dynamics that so resonated with our museum kids ended in the 1970s—a casualty, some feel, of changes in the neighborhood after a highway replaced the beautiful boulevard that once led to the museum. But even as that door was closing, another was opening.

In 1975, a federal court ordered the Buffalo Board of Education to eliminate racial segregation in the city schools. Similar directives elsewhere had resulted in forced busing, but in Buffalo, city and school officials hoped to achieve voluntary desegregation through a system of magnet schools. In 1980, the museum was approached about collaborating on a science magnet.

Although the actual school would take years to emerge (a process complicated by our location in a historic park), the museum almost immediately began renting space to the school district for four self-contained fifth and sixth grade classrooms. Museum educators collaborated with teachers to incor-

A more user-friendly lobby is one element of the museum's new community initiative. *Photo courtesy Buffalo Museum of Science*

Magnet or Charter?

A **magnet school,** according to the U.S. Department of Education, is "a public elementary school, public secondary school, public elementary education center, or public secondary education center that offers a special curriculum capable of attracting substantial numbers of students of different racial backgrounds. Magnet programs aim to eliminate, reduce, or prevent minority group isolation in elementary and secondary schools while strengthening students' knowledge of academic subjects and their grasp of marketable vocational skills."

The *Magnet Schools Assistance* program provides grants to eligible local educational agencies to establish and operate magnet schools.

Charter schools, also by Department of Education definition, are "nonsectarian public schools of choice that operate with freedom from many of the regulations that apply to traditional public schools. The 'charter' establishing each such school is a performance contract detailing the school's mission, program, goals, students served, methods of assessment, and ways to measure success."

Chartering is currently legal in 40 U.S. states, the District of Columbia, and Puerto Rico. Some 2,700 charter schools have been launched since the first states passed charter legislation in the early 1990s. Arizona has the most charter schools (464); California, the largest student enrollment (157,000).

Details: *www.ed.gov/programs/magnet/* and *www.uscharterschools.org/*

—Compiled by ASTC

porate collections and scientific research into the curriculum.

By the time the Dr. Charles R. Drew Science Magnet School (named for the African-American surgeon who helped to establish the first blood bank) opened next door in 1990, the groundwork had been laid for a productive partnership. Today the school serves 600 students in grades 2–6.

Over the years, the relationship was sometimes uneven, as museum and school district leadership went through changes, but both partners are demonstrating renewed commitment, and Drew students and faculty participate in numerous ways in the museum.

Science Activities Days—large-scale efforts that celebrate student research—are organized cooperatively by school and museum staff. The museum's children's area is a regular weekly stop for younger Drew students. Teachers, individually and in small groups, work with museum scientists and educators to identify new opportunities. Teachers and students together help to test exhibit prototypes in classrooms and in the museum gallery.

In the summer of 2002, Drew students mingled with scientists at the museum's Byron Ice Age dig in Batavia, New York. Their photos and measurements later formed part of a museum display. This year, in connection with a program on ancient cultures, the museum's anthropologist has taken artifacts and stories into classrooms and opened the museum's collections area to allow students broader exposure to implements used in different cultures.

Learning at the center

Renewed energy at the Drew School is one part of a larger Buffalo Museum of Science initiative that encompasses several new community partners. Two years ago, mindful of the model that had inspired the museum kids, we established what we call the Center for Science Learning (CSL). Its goal is to fulfill the museum's vision "to create a better world by helping all people explore and understand it" through tapping our assets more deeply in partnership with schools and community agencies.

Initial CSL partners included not only the museum and the Drew School, but also the active neighborhood King Center Charter School; First Hand Learning (an educational-materials development organization with museum roots); the University of Buffalo's Center for Applied Technology in Education; and the Institute for Learning Innovation. Recently, we added a third school partner, the Makowski Early Childhood Center for children aged 3–5.

Funded by the Oishei Foundation, the Institute for Museum and Library Services, New York State, and the Junior League, the CSL project has increased the number and effectiveness of engagements between youth and the museum in many ways. In the process, the capacity of museum staff in the areas of pedagogy and research methods has also increased. (See "Community Initiatives at the Buffalo Museum of Science," opposite.)

Having three school partners means that more than 2,000 students and 120 teachers are using the museum and museum resources in their educational programs. Feedback from partners has helped us create a setting in which schools can strengthen their involvement (and ours) with the families of their students.

Each of the partners has hosted a Family Night open house at the museum. Such events, supplemented by the free memberships we offer them, help to increase parent participation and expose families to the extended learning activities possible at the museum.

Why stop with schools?

As documented in this issue and elsewhere, science centers in many communities are significantly involved with the formal education system. Partnering with schools has brought access to new audiences.

But are we as museums taking full advantage of our assets in these partnerships? Are we really earning our identity as educational institutions? Or, faced with increasing overhead, do we play a double game—calling ourselves educational for the sake of raising capital, and then following an attraction model to get maximum revenue through our doors?

Some people cite the pitfalls of school politics, staff and administration turnover, union rules, and the pressures imposed by the quest for high test scores and caution science centers against pushing deeper into relationships with schools. Here in Buffalo, we have decided that success lies not only in better and more pervasive museum-school partnerships, but also in community partnerships that allow us to provide opportunities for children throughout their lives.

We envision engaging a child at 3, carrying her through to adulthood, and then having her come back with her own children and start the cycle anew. And why stop there, when we have a rapidly aging population with a strong interest in lifelong learning?

Our staff don't pretend to have all the answers, and I'm not sure our solutions would work for you. But I do think we all need to ask tough questions and be willing to act on what we learn. Yes, extended community partnerships pose challenges and risks. But if we want our museums to make a difference in the lives of children and youth—remember those museum kids?—then we need to keep pushing the educational envelope in partnership with stakeholders in schools, families, and community agencies. ■

David Chesebrough is president and chief executive officer of the Buffalo Museum of Science, Buffalo, New York.

Community Initiatives at the Buffalo Museum of Science

By Lynn D. Dierking, Cheryl Kessler, and Mika Cohen Jones

As described in Buffalo Museum of Science director David Chesebrough's article, the museum received major funding in 2001 to explore new ways of integrating its resources into the fabric of an urban community. This effort, known as the Center for Science Learning (CSL), demonstrates how science centers are, in Chesebrough's words, "earning our identity as educational institutions." In the CSL model, the museum becomes a place where people of all ages, backgrounds, and interests can participate actively in science learning.

Initial CSL efforts focused on supporting teachers and children at the museum's school partners, the Dr. Charles R. Drew Science Magnet School and the King Center Charter School. With the addition of the Makowski Early Childhood Center, this program has expanded, and there is talk of having the museum serve as the site for a "Science Day" Early Childhood Educator in-service this spring.

Major goals of the CSL project have been to utilize the resources and collections of the museum better and to involve museum scientists more integrally in educational activities. As part of the program, museum staff have been providing literacy mentoring for Drew students, and a section of the museum's public research area has been set up for a book exchange program for students and families.

Recent CSL efforts focus on providing extended science learning opportunities to families and to community-based organizations surrounding the museum, including a neighborhood church. Development, integration, and evaluation of these efforts has been overseen by the Institute for Learning Innovation.

Our research shows that after two years, there is more to see and do in the museum, and the exhibits and programs are offering a greater connection to the goals and objectives of schools and the larger community. Particularly noteworthy are two new inquiry-based lab spaces—one focused on the Byron Dig project, an ongoing Ice Age research effort of the museum in western New York, and one on Ecosystems & Adaptations—that are open to partner schools, community groups, and visiting families.

Much of the success and improvement in outreach can be attributed to the Community Relations Coordinator, whose position was developed through various funding opportunities. Since she began meeting with school representatives and community and neighborhood groups, and implementing strategies for letting them know about museum resources, there has been a significant increase in the number of calls to schedule visits and/or participate in special events and programs. Groups also have a better sense of what resources are available and now ask for specific offerings and/or activities.

Qualitative and quantitative data from both external collaborators and staff show that the Buffalo Museum of Science is now seen as a more welcoming place. One school partner commented, "Five years ago the museum was not accessible to neighborhood residents. Now it is becoming a user-friendly place for neighborhood children and families." The principal of Drew Magnet School echoed that statement, noting that the museum is "a much friendlier place" than it was a decade ago.

The majority of community partners felt that the museum's responsiveness to their organizations had "very much improved" over the last year, and community partners advised the museum to continue to make improvements.

The museum has also opened the door for more direct involvement by audiences. In connection with the new hall of astronomy, which opened in October 2003, 79 Buffalo elementary, middle, and high school teachers were invited to a half-day review and critique session for prototype exhibits. Participants' comments on the usefulness of exhibit components for students and their suggestions for improvements were taken into account before the exhibition opened.

Although challenges remain—particularly staff shortages caused by reduced city and state funding—the relationship between the museum and its community has fundamentally changed, and there is no turning back.

Lynn D. Dierking is associate director, and Cheryl Kessler and Mika Cohen Jones are senior researchers at the Institute for Learning Innovation, a not-for-profit learning research and development organization based in Annapolis, Maryland.

Museum-School Bridges:
A Legacy of Progressive Education

By George E. Hein

Having museums sponsor schools—and schools make more extensive use of museums—is a concept that has reemerged in the United States in the past decade. But this form of pedagogy is not new. It goes back more than 100 years, to the "Progressive Era" of the early 20th century.

In 1900, the United States was a society with strongly entrenched racism, few constraints on exploitative capitalism, and a burgeoning immigrant population. Visionary leaders appeared who sought, through legal and political means, to diminish the dramatic contrast between rich and poor and to improve social services. They championed such disparate goals as voting rights for women, child labor laws (thus making public schooling possible), and better working conditions for the average man and woman.

Progressive education grew out of this larger social and political movement. In the school community, John Dewey would become its chief proponent. And in the museum world, John Cotton Dana would be identified with a parallel effort.

Progressivism in education

The two champions of experiential learning had much in common, although there is no evidence that they interacted or even met.

Both Dewey and Dana were born in Vermont in the 1850s; both received their education in the eastern United States, spent formative years in the American West, and returned to influential positions in the East (in New York and Newark, respectively). And both emphasized similar principles:

John Dewey
Columbia University Archives–Columbiana Library

- the importance of education for improving society,
- the primacy of experience and the use of objects for learning, and
- the need for a rich learning environment, unencumbered by traditional subject classifications.

John Dewey (1859-1952) founded the remarkable Laboratory School at the University of Chicago in 1896; he would go on to teach philosophy at Columbia University from 1904 until his retirement in 1930. Dewey was well known for his advocacy of learning through doing and for his insistence that the knowledge in books is dry and dead until it is "put to use" (that is, associated with action). He was also a strong advocate for the incorporation of museums as part of the educational process.

In his seminal 1900 book *The School and Society,* Dewey suggests that a school should be like a two-story building that houses the various functions of real life. The activity centers—kitchens and workshops, gardens and industries—would surround two central rooms, the library and the museum, with the latter providing a link between the mere "doing" of experience and the reflecting on it.

The Chicago Laboratory School modeled his ideas. His students—who included both boys and girls—tended gardens, worked at carpentry, cooked, and wove. They went on numerous field trips and visited the Columbian Field Museum (then located near the school, at the site of the present Museum of Science and Industry) for an hour and a half each week.

Dewey believed that if a society is to address injustice and discrimination and progress toward a more democratic state, then members of that society need to be educated to think for themselves and question the status quo. All societies educate, he taught, but a traditional education that only reproduces the current culture will do nothing to support change. If we are not satisfied with the current state of the world, progressive education is needed.

John Cotton Dana (1856-1929) was director of the Newark Museum from 1909 until his death. He came to museum work from a background directing libraries, and he applied the community-service philosophy of the American public library to his new task. Devoted to "opening up" institutions, he advocated outreach pro-

grams, nature study outside the museum, and activities in the galleries.

Dana argued that the role of the museum was primarily to serve the community, and he put education above collection. Railing against "the undue reverence for oil paint," he wrote that "if oil paintings are put in the subordinate place in which they belong, the average art museum will have much more room for the display of objects which have quite a direct bearing on the daily life of those who support it."

In "Schools and Museums," an article recently republished in *The New Museum: Selected Writings of John Cotton Dana* (Newark, New Jersey: the Newark Museum Association, 1999), Dana proposed "school museums" that would "lend...objects useful in school work, prepared by a corps of workers [at a museum] who are in close touch with the schools." His vision included the creation of branch museums in many public places, including churches, factories, and even the schools themselves.

"A good museum attracts, entertains, arouses curiosity, leads to questioning and thus promotes learning," Dana wrote. "It is an educational institution that is set up and kept in motion—that it may help the members of the community to become happier, wiser, and more effective."

Progressivism and hands-on science

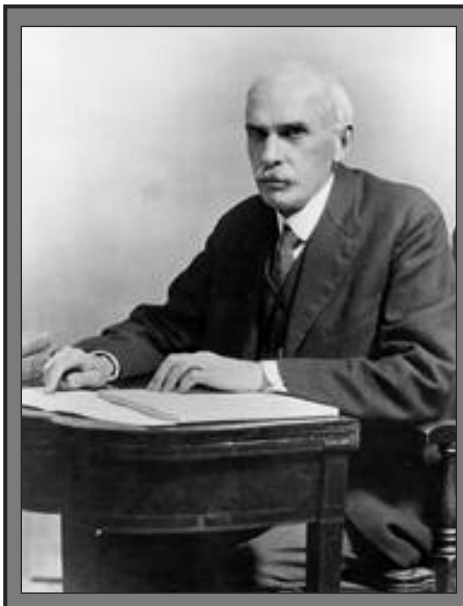
Today, when we still face the problems of a dramatic (and widening) chasm between rich and poor, the discriminatory treatment of immigrants, and the lingering effects of a racist heritage, it is useful to remember the vision embodied by Dewey and Dana.

Progressive education has never gained mainstream acceptance in public schools, but it has also never disappeared. In the 1960s, I was fortunate to be part of the Elementary Science Study (ESS), a major reform effort in K–6 science education that was funded by the National Science Foundation. Program director David Hawkins, a philosopher, often wrote and spoke about John Dewey, and the more than 100 scientists, artists, and educators who worked for ESS identified strongly with the progressive education movement. All of us were committed to producing materials to match the philosophy we espoused.

The curriculum units we developed (optics boxes, spinning tables, pattern blocks)—as well as the pedagogic practices emphasizing inquiry—became the basis of science instruction in many U.S. elementary schools in the 1960s and early '70s. And when the first science centers were established (some by former ESS staff members, such as Frank Oppenheimer of the Exploratorium), our interactive materials and programs made a ready transition into that setting. So progressive education is still very much alive in science centers and museums around the world.

It also continues to find champions in the debate about schools. In an April 1999 article in *Education Week,* Julian Weissglass, director of the Center for Educational Change in Mathematics and Science at the University of California, Santa Barbara, contrasted the worldviews that define different approaches to education:

> *The debate between traditionalists and progressives…is essentially a debate…about the nature of learning, the nature of society, and the purpose of schools in a democracy. Traditionalists structure schools to prepare students for filling roles in society—not for transforming it. They do not see that traditional approaches may contribute to maintaining the inequity and injustice that exist in our society. Progressives see society as needing improvement and the schools as serving the function of helping students become thinking citizens who can contribute to creating a more just society.*



John Cotton Dana
Photo courtesy Newark Museum

Effective museum education activities allow students to ask questions, interact with objects, and explore the processes that lead to a richer understanding of the world.

In this era of standards-based curricula and high-stakes testing, it is worth reemphasizing the importance of keeping museum education focused in the direction of open, inquisitive use of material resources—not in the direction of the constrained, answer-driven minutiae of worksheets.

It is equally important to remember the social implications of our philosophy. Not only must we, as museum educators, embrace and employ what we have discovered about human development and learning, but we must also acknowledge that our pedagogic practices shape the society we are helping to nurture. By doing so, we retain our social relevance and remain true to a long and noble tradition of progressive education. ■

George Hein is professor emeritus at Lesley University, Cambridge, Massachusetts. This article is based on his keynote address for the Northeast Informal Science Education Network (NISEN) Conference in 2001. The original text can be found at www.lesley.edu/faculty/ghein/papers_online/nisen_2001.html.

AN ASTC MUSEUM-SCHOOL SAMPLER

Charles R. Drew Science Magnet School
http://gateway.drew.buffalo.k12.ny.us/
ASTC partner: Buffalo Museum of Science, Buffalo, New York
Prekindergarten–8
(See page 3.)

Chrysalis Charter School
www.enterprise.k12.ca.us/chrysalis/
ASTC partner: Turtle Bay Museum & Arboretum, Redding, California
Kindergarten–8
(See page 12.)

Community High School at the Jefferson Center
www.communityhigh.net/
ASTC partner: Science Museum of Western Virginia, Roanoke, Virginia
Grades 9–12
Community High partners with more than a dozen cultural and civic organizations in the Roanoke Valley, plus the Thomas Jefferson Center for Educational Design at the University of Virginia.

Compton/Drew Investigative Learning Center
www.slps.k12.mo.us/Services_Directory/RecNcouns/MidComptonDrew01.html
ASTC partner: St. Louis Science Center, St. Louis, Missouri
Grades 6–8
Compton/Drew's curriculum springs from the interactive Schools for Thought program. The school partners with St. Louis Science Center staff for project development and academic instruction.

DeKalb County School System/ Fernbank
http://fsc.fernbank.edu/
ASTC partner: Fernbank Science Center, Atlanta, Georgia
All grades
In a unique arrangement, the DeKalb County schools run the Fernbank Science Center and the adjacent Fernbank Museum of Natural History), and the science center directs science for the district.

Exploris Middle School
www.exploris.org/learn/ems/index.html
ASTC partner: Exploris, Raleigh, North Carolina
Grades 6–8
Exploris Middle School takes an integrated approach to learning, in which academic disciplines and basic skills are addressed through broad themes and projects, and authentic, real-life experiences.

Genesee Community Charter School
www.gccschool.org
ASTC partner: Rochester Museum & Science Center, Rochester, New York
Kindergarten–5
(See page 13.)

Henry Ford Academy
www.hfacademy.org/
ASTC partner: Henry Ford Museum & Greenfield Village, Dearborn, Michigan
Grades 9-12
Henry Ford Academy is a partnership of the Ford Motor Company, the Henry Ford Museum & Greenfield Village, and Wayne County Regional Educational Service Agency.

Museum School
www.fortworthmuseum.org/school.html
ASTC partner: Fort Worth Museum of History and Science, Texas
Preschool–6
In operation for more than 50 years, Museum School combines natural and physical sciences with history, anthropology, art, music, and literature.

Museum Magnet Elementary School
http://ltc.smm.org:7780/mms
ASTC partner: Science Museum of Minnesota, St. Paul
Kindergarten–6
Students at MMES learn to make their own exhibits, joining science, engineering, art, and technology with research and language arts. SMM staff are based at the school, and the museum brings many other resources to the program.

New York City Museum School
www.newvisions.org/nvschools/schools/index.shtml
ASTC partner: American Museum of Natural History, New York
Grades 6–12
Founded by a former Brooklyn Museum assistant director and a Lab School teacher, NYCMS partners with four New York City cultural institutions in addition to AMNH.

Normal Park Museum Magnet
www.hcde.org/magnet/npmm.htm
ASTC partner: Creative Discovery Museum, Chattanooga, Tennessee
Kindergarten–5
(See page 17.)

Ontario Science Centre Science School
www.ontariosciencecentre.ca/school/osc_school/about/asp
ASTC partner: Ontario Science Centre, Toronto, Canada
Grade 12
(See page 9.)

School in the Park/Rosa Parks Elementary School
www.schoolinthepark.net
ASTC partner: Reuben H. Fleet Science Center, San Diego, California
Kindergarten–5
(See page 16.)

Science Center School
www.casciencectr.org/Education/AboutUs/ScienceCenterSchool/ScienceCenterSchool.php
ASTC partner: California Science Center, Los Angeles, California
Kindergarten–5 (opening fall 2004)
(See page 14.)

A Semester for Science:
Ontario's Science School Program

By Catherine Paisley

Since 1982, the Ontario Science Centre has operated a full-time, on-site educational program for students in their final year of high school. The Ontario Science Centre Science School (OSCSS) offers two four-month semesters each year (fall and winter) and accepts 28 students for each. Our partners in the project are the Toronto Catholic District School Board and the Toronto District School Board.

The program combines regular Ontario ministry courses—a choice of three from biology, chemistry, calculus, and physics—with a strong emphasis on science communication. As much as possible, we try to include the students as part of whatever is happening at the science center. It enriches them, and it enriches the experience we offer to everybody else. Students participate in our hosting program on the floor, in behind-the-scenes projects with staff mentors, and even in our informal organization-wide activities, such as the United Way campaign or staff Christmas party.

A certain kind of student

OSCSS was founded by the science center, the Ministry of Education, and the East York and North York boards of education to "provide a unique science enrichment opportunity for senior high school students from across the province." Entry has always been competitive. Selection is based on strong academic performance, two teacher recommendations, a written statement from the student, and an interview.

The science center does not provide housing, but we do help students find places to live. Tuition is covered by the Toronto district boards, and assistance with living expenses is available, if needed, through a scholarship program supported by OSCSS sponsor Alcan Inc.

It's quite a decision for students to come to the school. Besides the academic challenge, there's rent and groceries and living away from home, often for the first time. And for students involved in home school sports or music or whatever it might be, coming here means stepping away from that for a semester. The decision depends on what value they put on those other things, and whether they're ready to give them up.

Each student in the Ontario Science Centre Science School receives training in hosting and spends time with visitors on the exhibit floor. *Photo courtesy Ontario Science Centre*

We don't need to select for diversity. Ontario is remarkably diverse—culturally, ethnically, and religiously—and the applications we get are representative of the province.

We do find that we tend to get more young women than young men. Perhaps the men are more interested in sports and things going on in their home school, or perhaps they're less ready to move away and do something different. We try to keep it even, but often the group will be 60 percent women, 40 percent men. Sometimes it's even 70-30, or 75-25. Since recruitment is done for a year at a time, we might even out the genders by accepting a student for the winter semester instead of the fall. But it's not a deciding factor.

The pace at OSCSS is quick, and expectations are high. In addition to their classroom work and science center assignments, students get involved in a variety of outside projects and contests, such as the chemistry and math Olympiads, regional and national science fairs, and university-sponsored science competitions. Last year, our biology students did a research study on a local river, submitted their paper to a journal, and were published.

Because we want everone to succeed, we are careful in whom we accept. A student who is already struggling will fall behind that much faster here. Every now and then, we do lose a student back to the home school.

A certain kind of teacher

Staff who support OSCSS directly include the Science School Coordinator, a science center employee who manages the applications and the administrative side of the school, and two teachers from each of the Toronto school boards. All four teachers work on a one-year contract, and one serves

as lead teacher for the school.

Two partner schools close by support us with guidance counselors and attendance records and record the students' grades. OSCSS is officially a satellite classroom of those two schools, although we operate independently.

Like choosing students, choosing the teachers is a competitive process. We post openings in the winter or spring for the following fall, and we go through the applications as if we were hiring a staff member. Generally, we try to bring on teachers who have been involved in a number of different projects in their home school—whether it's biology competitions or robot challenges—so they will bring that to our school as well.

Because it's best not to have all new teachers each year, we usually ask two to stay on for a second year's contract. This provides continuity, and the experienced teachers can help mentor the new ones. A new teacher will also spend a day or two in the spring with the departing same-subject teacher, so he or she can learn where the labs are and what equipment we have, and receive instructional notes or lesson plans.

Under the terms of their contracts, teachers are responsible not only for teaching academic subjects, but also for delivering programs to the children who come on school visits. In one day, for example, an OSCSS teacher might see his grade 12 students in a physics class, teach a Pulleys & Gears workshop to a grade 2 class, and run a Human Body auditorium program for 200 fourth graders. We look for the kind of person we think will enjoy that type of challenge.

A syllabus for personal development

Most OSCSS students and teachers have been to the science center before they enter the school. But it's a different type of environment when they know they're going to be here every day for four months.

Each semester begins with a communications workshop. The students arrive, meet their teachers, and choose their courses, and then everybody goes off-site for a day and a half to do a team ice-breaker and get to know each other better.

During the semester, each student will spend about 10 hours with a staff mentor, exploring opportunities for different careers within a science center or within science itself. Mentors come from many departments—fabrication department, graphic design, science communications, digital media, or more. Some may not have a specific science background; others may be Ph.D.'s. The students contribute to whatever project the mentor is working on. They may do background research, work on a demo, or help with prototyping.

OSCSS students thrive on the independence of this learning environment. They like it that they can call their teachers by their first names. They have their own student lounge where teachers don't go (or hardly ever). The expectation we have for them from the beginning is that they will act as adults, and we treat them as adults. It's a matter of mutual respect, and they enjoy that.

The teachers, too, thrive on the change. Whether it's teaching a group of truly keen and talented students or doing presentations for children from junior kindergarten up to grade 12, they have a very different kind of experience at OSCSS. When they go back to their home schools, or to other schools within their board, they take back new teaching strategies or methods to share, contributing to systemic change within the education community.

None of this would happen without the whole-hearted support of the entire science center staff. Students and teachers say they feel a wonderful sense of ownership and belonging as soon as they arrive. That is because we, as an organization, embrace this program and see the value within it.

After they leave us, most OSCSS students will go on to university in the sciences. A handful may go into design or general art. Some, especially those who were keen on biology, choose medicine. Many maintain a connection with the science center as members, and we even have a couple on our current staff, including our senior science communicator and researcher.

Some of the past "Semesters" (that's how they identify themselves; the current group is Semester 43) get together on an occasional basis. With the school's 25th anniversary not far off, we hope to create a database of alumni—to track down as many as we can and find out what they are doing. We know there are wonderful stories out there.

Certainly, OSCSS students leave here with a new sense of themselves and of what they might be able to accomplish in the world. At the end of each semester, we hold a small ceremony at which one or two students chosen by their peers have a chance to address the assembly. Here's how the "valedictorians" of Semester 37 summed up their experience:

"...We think of ourselves before the science center, and we realize how unsure we were of our goals, our values. Suddenly it seems to make sense to care about school. It makes sense to spend the night pondering physics formulae and biological conundrums. To walk in every day knowing that we will be met with new challenges, and not mundane repetition. To interact with individuals who are actually passionate about their interests and values, who care about individuality, not conformity, who realize that eccentricity is not a sin but a virtue. Our paths from here seem so much clearer and less fraught with adolescent insecurities." ■

Catherine Paisley is director of science education at the Ontario Science Centre, Toronto, Ontario, Canada. For more information about the school, visit www.OntarioScienceCentre.org.

In Their Own Words:
Middle School Students' Experiences at the American Museum of Natural History

From 1998 to 2000, graduate students in the Bank Street College museum education program conducted a longitudinal study of students at New York City's Science Museum School (MS 44).

Sixth, seventh, and eighth grade students from SMS traveled with their science teachers to the American Museum of Natural History (AMNH) one day a week to observe exhibits, handle objects, do experiments in the museum lab, see special exhibitions, and complete individual projects.

Twenty-one students were observed briefly at AMNH and interviewed at the end of each school year. In their eighth grade year, some also participated in small focus groups.

The overall purpose of the study was to document how students' views of science and of the museum changed over time. The researchers considered the data from three perspectives: developmental, constructivist, and contextual. The following student comments in response to two key questions are taken from the 1998 interim report (a summary of sixth-grade responses), the 1999 interim report, and the 2000 final report of the project, all written by Bank Street instructor and director of museum education Nina Jensen.

What were SMS students' attitudes toward science before starting the school, and how have their attitudes and understandings changed at the end of each of their three years at the school?

The children uniformly recognize and appreciate the hands-on approach, focus on experiments, and in-depth learning. Some spoke about broadening their perceptions of the science field, seeing that it encompasses more than they initially realized. *(6th grade summary)*

To me, science is really about studying, trying to find things out, how they happened and why they happened. *(7th grader)*

Last year I really didn't think of science in that way. I thought science is just learning about something. But this year it's different because we're more scientists than we think we are. *(7th grader)*

You can make a question and it's possible to answer it, but it might take 20 years...or 10 years. I learned how hard [scientists] work. I realized how hard it could be to answer one question. *(7th grader)*

Last year...we were doing our own research in Central Park.... We went to the park and chose a type of scientist to be, like chemists or biologists or botanists.... This year it hasn't been that type of thing.... It's been learning earth science. You don't learn about the processes. *(8th grader) [Note: 8th graders spent much of the year preparing for the N.Y. Regents exam in earth science.]*

Science is everything. Right now you are science—your structure is science. Your DNA is science, your saliva is science—like no matter what, everything is surrounded by science. *(8th grader)*

What were SMS students' attitudes toward AMNH before starting the school, and how have their attitudes and understandings changed at the end of each of their three years at the school?

Well over half of the children discussed having greater familiarity with the museum.... One commented that it is an "honor" to be able to visit the museum so frequently and to go behind the scenes where other people don't go. (6th grade summary)

I used to think that the museum was just exhibits, but now it's something more. I didn't know that they studied there and everything...that there are insect labs and stuff. *(7th grader)*

The museum's really about teaching people about stuff—like instead of letting them listen to it, letting them see it for themselves. It's better that way because we get to look at things, view them for ourselves. We're teaching ourselves in a way. *(7th grader)*

Now we know the museum back to front. We know our way around. We know where to find information. . . . I feel more comfortable in the museum now. (*8th grader)*

When I first came to this school...I was like, you go to the museum for the dinosaurs—that's it.... But now for me it's not just fun—it's a workplace. I know my way around. *(8th grader)*

In concluding their study, the researchers agreed that "…responses of the SMS students over the three years suggest that the school has met with considerable success in its use of AMNH to enliven and enrich the science curriculum, and to enhance students' understanding of science concepts."

They also noted that many of the changes observed during the study were related to the developmental issue of independence, finding that by the end of eighth grade, "SMS students consider themselves to be more competent users of the museum, and see their skills of wayfinding, observation of objects, and sense-making of exhibitions as transferable to other museums. As the students have matured, their appreciation for the museum has tended to grow, although for many their excitement and enthusiasm for it have worn off."

For more on the SMS-AMNH study, write to ninajensen@bnkst.edu. ■

Chartering a Course:

Three Communities, Three Schools

In the United States, charter school legislation (see sidebar, page 4) supports independence and individuality within the larger school-district structure. Read how three communities have tailored charter schools to meet their needs.

Growing Naturalists

By Traci Wierman

Nearly a decade ago, two museum educators, Alysia and Paul Krafel, were thinking about starting a school. The couple worked at Carter House Natural Science Museum, in Redding, California. This small, comfortable space offered a variety of activities, including a home-school class and *Big Foot, Little Foot,* a program for parents and very young children.

Based on their experiences at the museum, the Krafels began to wonder, "Can we grow naturalists? Can we provide the kind of educational experience that develops children's naturalist capacities?" At the same time, *Big Foot, Little Foot* parents were thinking, "Maybe we ought to home-school our kids."

Realizing that they could get public funding for a charter school, the group put together a plan. In 1996, the Chrysalis Charter School (CCS) was approved by the Enterprise Elementary School District (EESD), a 4,000-pupil system in Redding, and classes started that fall.

While still at Carter House, the Krafels had received a Howard Hughes grant to create eight curriculum units on natural science topics. All were locally based—there's one on volcanoes, one on birds of Northern California, one about how to do a study of ants in the schoolyard. These units formed the foundation of the naturalists program, and we still use them.

In the meantime, Carter House had become the Turtle Bay Museum & Arboretum, joining other local environmental education groups to form Turtle Bay Exploration Park, a 300-acre complex that straddles the Sacramento River in the heart of town.

The salmon run in South Cow Creek provides an opportunity for CCS students to dissect fish carcasses and learn what salmon eat—and what eats them. *Photo courtesy Chrysalis Charter School*

From the beginning, some CCS classes were held at the museum site, which comprises about 60 acres of the park. In 2002 Turtle Bay Museum moved to a new structure, and the school took over its former administration offices. The site also includes the Interpretive Forest, an outdoor exhibit space where CCS students study animals and plants and do experiments.

The school program

Officially, CCS is a K–8 charter school, with an enrollment of around 90 students and 4½ full-time teachers. Unofficially, we call ourselves a "tweener" school—not quite a traditional public school and not quite a home school.

The program could not exist without its remarkable parents. CCS faculty teach the math and science, but parents handle much of the rest. Literature, dance, Spanish, karate, ancient Greek history—all of these "co-op" classes are taught by volunteers with expertise in the relevant subjects. Parents also lead field trips to local businesses or natural areas.

Interested students are chosen by lottery in the spring. Until 2003–2004, they would attend classes a minimum of two days a week, and parents would work out the rest of their schedule in consultation with teachers. Recently, the state legislature passed new rules for charter schools. We are now required to have 80 percent of our students in school at least 80 percent of the week.

Before the change, many co-op classes were taught in students' homes. Now, parents are in the school building. (To avoid crowding, we also lease some additional space.) While I'm teaching kindergarten science—at least one certified teacher must always be on-site—in the three rooms next door there could be one mother teaching cooking, another teaching painting, and a third doing a literature circle. All students are still home-schooled one day a week.

We have always had state accountability requirements, called P-records, in which parents document that students are covering the mandated

content areas, doing their homework, and meeting goals set for them on a monthly basis. Parents still turn in a P-record for their one home day, and teachers sign off on that.

Partnering with the museum

For a teacher, having the museum next door is truly a gift. I work three-quarters time for Turtle Bay and one-quarter time for CCS. Recently, I was doing the Lawrence Hall of Science's GEMS Aquatic Habitats unit with first and second graders. The students labeled their fish diagrams, and we discussed all the words. Then we trotted over to the museum and sat in front of the Visible River aquarium to watch the live fish—all native species—swim by. Not only could we identify the pectoral and dorsal fins; we could also say, "That's a brown trout. That's a rainbow trout. No, that's a sturgeon." It makes it real.

For the students, there's a strong sense of ownership. They are completely at home in the museum's indoor and outdoor spaces. Once I wanted to collect daphnia with a class, but I didn't know where to find them. An 8-year-old CCS student did. She took us out and had us on the ground, digging: "Oh, I think we found it. Kevin, come here. Look at this worm!" That girl could have managed a group of high schoolers.

What does the museum get from the partnership? Collaboration is one benefit. Staff can count on CCS faculty to help with functions like planting and native-plant restoration. And when the museum couldn't do a program at Redding's Return of the Salmon Festival this year, CCS teachers brought down a large stream table and did the outreach. Students also constitute a natural test audience for Turtle Bay exhibits and programs.

Another benefit, of course, is the steady income from the lease. And I personally believe that having the school also helps with positive public perception: People know CCS is here, and that it is part of Turtle Bay. Still, there is more we could do. I am currently working with our membership coordinator to encourage more CCS families to join the museum.

Partnering with the district

As a charter school, CCS operates independently from the rest of the school district. We get standard per-pupil funding but set our own budgets. Our teachers work for EESD but don't have to join a union. CCS doesn't offer transportation, food service, preschool, or summer school, and we don't participate in federal categorical programs.

A unique feature of our charter is that teachers set their own classroom budgets, based on the number of students we choose to have (always recognizing that parents like to keep classes small). If a typical allotment is $3,800 per pupil, for example, having 15 students means a class budget of $56,000, and 20 means $76,000. How that gets spent is up to the teacher. We all share overhead, but each teacher chooses how much to allot for materials, supplies, and salaries for ourselves (or aides, if desired).

Academically, CCS does as well as or better than other EESD schools. In California, the standard rating for schools is the Academic Performance Index (API); out of a possible 1,000, 800 is considered a good score. CCS's current score is 798. On the California Standards Tests, our students are consistently at or above proficiency levels. So the model is working well.

More important than test scores is the quality of the educational experience students find here. Because the school curriculum is not textbook-driven, students become accustomed to analyzing information, sharing ideas, and reaching their own conclusions. Paul Krafel, who teaches third through eighth graders, says he often overhears lively discussions continuing over lunch, with no teacher participating. And I am constantly amazed at the level of questioning and understanding among my younger students. CCS is truly growing naturalists. ■

Traci Wierman is director of education and community outreach at Turtle Bay Museum & Arboretum, Redding, California, and a K-2 teacher at the Chrysalis Charter School.

Good Neighbors

By Kate Bennett

Staff at the Rochester Museum & Science Center (RMSC) had long been troubled to see that students in the city's school system weren't getting the kind of opportunities they deserved. So in 1998, when a local foundation approached us about becoming a partner in a new charter school, we began immediately to work toward that possibility.

RMSC had experience in this area because sixth and seventh graders from the Marcus Whitman School District were already attending classes daily at our Cumming Nature Center, 30 miles south of Rochester.

First graders at Genesee Community Charter School settle in for an "expeditionary" assignment: drawing a frog from life. *Photo courtesy RMSC*

From that experience, we knew the benefits that such a program offers: The kids bring good energy, and the school pays rent—two things we prize. We knew too, from the happy letters we receive from Marcus Whitman parents, that we could make a difference in the children's lives.

With that as background, four years ago we entered into partnership with a group of teachers whose previous project—a community-based curriculum for the city school district—had been dropped during budget cuts. In 2000, the Genesee Community Charter School (GCCS) was chartered by the state of New York.

Begun as a K–3 institution, GCCS has grown one grade a year. Next year, we will complete our growth to K–6. Enrollment is 185. The school moved into underutilized space on the museum's campus. Although this arrangement can get crowded (it was particularly hard the first year), we work it out because each party values the other. At RMSC, we're happy that the school pays rent, and at GCCS, they're happy that the museum pays attention to things they don't have to worry about. (An extra benefit is that GCCS is on a 10-month lease, so the museum can use the classrooms for summer camps.)

The foundation suggested that we not reinvent the wheel for curriculum, but instead use what has worked elsewhere. We found a good curriculum partner in Expeditionary Learning Outward Bound (ELOB). In their program, the school year is divided into three "expeditions," and the children do field studies to gather information for each. ELOB partners with the school to coach teachers, and the results have been great.

In GCCS's first two years of operation, students have worked with RMSC curators; studied the Genesee River, from the headwaters to Lake Ontario; and published a book. A CD on the Erie Canal is in the works.

The museum appoints three board members to the GCCS board, and our financial office does some work for the school. We have begun applying for grants together and thinking what else is possible. When serious budget cuts hit RMSC last year, we had eager constituents ready to help us out in any way. It was good positive energy at a difficult time. ■

Kate Bennett is president and CEO of the Rochester Museum & Science Center, Rochester, New York.

Envisioning a School

By Jacques Bordeaux and David J. Combs

Imagine a bright and welcoming elementary school located near world-class museums, a major university, and a new professional-development center for teachers. The school features an integrated curriculum, with an emphasis on science, mathematics, and technology. Its teachers are known for their ability to make science and math engaging and accessible. Best of all, this is a neighborhood school, offering its resources to underserved groups of children and their parents in the inner city.

Such a dream is about to be realized in South Los Angeles, California, where the new Science Center School—the result of more than a decade of collaborative work between the California Science Center and the Los Angeles Unified School District (LAUSD)—will open its doors in September 2004.

The LAUSD is the second-largest school district in the nation, with almost 750,000 students and 38,000 teachers in more than 700 schools. The majority of the students are from underserved audiences (72 percent Latino, 12 percent African American), and more than 200 district schools run on three- or four-track "year-round" calendars to relieve crowding.

It is difficult for an organization like the LAUSD to dedicate significant resources to projects that are clearly "outside the box." So how can the district work with an institution of informal science education to make something like the Science Center School happen? One of the key factors in the progress of the project was the leadership role taken by the science center.

From the start, California Science Center staff recognized the importance of negotiating strong, formalized agreements with the district. The first to be signed was a 1992 memorandum of understanding; this codified the partnership and laid the groundwork for more formal agreements. In 2000, a lease settled land and joint-use issues. A joint development agreement, finalized in 2001, addressed construction. And finally, a joint participation agreement, completed in 2002, laid out the general

Science Center School Vision

By the year 2010, the Science Center School will be a national model in elementary education through the innovative use of science, mathematics and technology as the foundation for a rigorous and exciting multidisciplinary learning experience for kindergarten through fifth grade students.

This will be achieved through the following:

- Drawing on the dynamic partnership between the California Science Center, the Los Angeles Unified School District, the University of Southern California and other Exposition Park entities.
- Maintaining strong and effective leadership, along with dedicated and highly-trained teachers and staff.
- Establishing school operations and instructional practices that value diverse learning styles and provide rich experiences for all learners.
- Modeling collaborative engagement of parents, teachers, and professional staff from the school's partner organizations.
- Designing and implementing an innovative, learner-centered curriculum based on current research and national education standards.
- Researching, developing and advancing best practices for engaging students and effectively integrating a wide range of resources through the adjacent Amgen Center for Science Learning.

Artist's rendering courtesy California Science Center

framework of how the science center and the LAUSD would work together to operate the school.

For us at the museum, the building of the Science Center School represents a crucial step in a 25-year master plan. The construction site is part of the California Science Center complex and includes not only the new building that will house 22 of the school's 28 classrooms, but also the renovated Wallis Annenberg Building for Science Learning and Innovation (formerly the Armory Building, at left in artist's rendering above).

The Annenberg Building will house more classrooms, the school administration offices, a cafeteria/auditorium, and the school library. But the bulk of its 80,000 square feet will be devoted to the science center's education division, the Amgen Center for Science Learning. Features include classrooms, science labs, a professional library for educators, a video production studio/computer lab, and a series of four experimental platforms for teachers and students (the Big Lab) that include a bamboo forest with ecology pond; a construction and wind wall; a drop tower; and a reflecting pool for water experiments.

All of this puts the school directly adjacent to cutting-edge facilities that will house many California Science Center programs, including community programs, summer science camp, camp-ins and a burgeoning teacher professional-development program.

Crucial to the project's success was the envisioning process we carried out in 2002 to identify what this school would truly be about. The science center hired a facilitator (David Heil and Associates) and brought together participants from a broad cross-section of the L.A. education community for 2½ days of meetings over two months.

Participants included LAUSD teachers, principals, parents, administrators, as well as representatives from seven local partners: the Natural History Museum of Los Angeles County; the California African American Museum; the Exposition Park Intergenerational Community Center; the University of Southern California; California State University Los Angeles; NASA's Jet Propulsion Laboratory; and the Los Angeles County Office of Education. For the results, see "Science Center School Vision," opposite page.

Continuing this lead role, the science center, with state support, added a full-time position dedicated to overseeing the Science Center School project. In addition, we often paid for, or did, things we felt were critical to the goal of making this an exceptional school. We wrote the school charter, which was approved in November. We asked the dean of the USC Rossier School of Education to serve on the school's steering committee, and we are now talking about having the school serve as a USC teacher training school and an object of research for graduate students and faculty. We hired a principal, and school is set to open in September.

Will the Science Center School be a success? Obviously, we won't know the answer for a while. But by bringing together the unique qualities and vision of a science center with those of a large school district, we have taken important strides toward fulfilling our vision for a different kind of school. ■

Jacques Bordeaux is director of the Science Center School project, and David J. Combs is deputy director for education at the California Science Center, Los Angeles.

MUSEUM-SCHOOL RESOURCES

"Catching the Wave: Lessons from California's Charter Schools"
www.ppionline.org/
Use the Search function to access this article by Nelson Smith, published in *Progressive Policy Institute Policy Report,* July 9, 2003. Smith was the first executive director of the District of Columbia Public Charter School Board and served as a member of the federal panel that drafted regulations for the No Child Left Behind Act.

Center for Education Reform
www.edreform.org
Click on "Publications" to find the September 2003 CER Report "What Research Reveals about Charter Schools."

Museum School Partnership
www.iag.net/~ksking/muslearn.html
Abstract and proposal for "Alternative Educational Systems: A Multi-Case Study in Museum Schools," a 1998 doctoral dissertation by Kira King (Indiana University); site includes a link for ordering the publication. *(Note: Many institutional links on this site have expired.)*

Museum Schools Symposium 1995: Beginning the Conversation
The proceedings of an ASTC-sponsored conference held at the Science Museum of Minnesota in 1995. Includes case histories from SMM's Museum Magnet School, the Charles Drew Science Magnet School, the New York City Museum School, the Elementary Professional Development School (Tampa, Florida), and the District of Columbia Museum Magnet Schools Project. Limited copies are available for a small fee; contact SMM School Visits Program coordinator Maija Sedzielarz, *maija@smm.org.*

Museums and Public Schools (MAPS)
www.museumsandpublicschools.org/
The web site for a Chicago program designed to strengthen relationships between the Chicago Public Schools (CPS) and local museums, including the Chicago Children's Museum, the Field Museum, and the Peggy Notebaert Nature Museum of the Chicago Academy of Sciences. The site includes two curriculum units–"Introducing Museums" and "Learning from Museums & Living Things"—with suggested activities for Grade 3. More content will be posted soon; for information on how to organize a MAPS-type program in your community, contact program administrator Pat Fassos at *pfassos@csc.cps.k12.il.us.*


Among the more than one dozen speakers were new ASTC Fellow Alan Friedman, left, and keynoter Michael Gartner. *Photos by Bruce Cochran/Satellite Design*


A PRETTY GOOD CONFERENCE

An early cold snap hit St. Paul, Minnesota, as delegates arrived for the 2003 ASTC Annual Conference. But wind chill and temperatures well below freezing did not cool the enthusiasm of the more than 1,500 registrants and presenters, and nearly 300 volunteers who participated in preconference programs and the November 8-11 gathering. Present were representatives from 32 countries, including 179 delegates from outside the United States.

Jim Brandenburg's stunning film of Minnesota's wild places and some lessons in the local lingo quickly made us feel at home. Certainly, the hospitality of the Science Museum of Minnesota was warm enough. What truly distinguished this conference was the remarkable energy and generosity of SMM staff and volunteers as they opened every corner of their institution to eager delegates.

In more than 40 workshops and sessions—not to mention Saturday night's "Learn to Have Fun, Minnesota-style!" party and Monday's working Open House—they took us behind the scenes and shared the many secrets of a world-class science center. And who could forget the magical touch of a full lunar eclipse (a masterpiece of scheduling) viewed through telescopes set up on SMM's Kellogg Boulevard plaza?

The Science Center of Minnesota, this year's host, was the site for more than 40 events, sessions, and behind-the-scenes tours. *Photos by Carolyn Sutterfield*

Conference notables

Saturday's plenary session began, fittingly enough, with a tribute to two champions of informal science education who have helped to shape the field. U.S. senator Barbara Mikulski, whose duties kept her in Washington, was honored in absentia as one of two 2003 ASTC Fellows. The highest-ranking Democrat on the Appropriations Subcommittee on Veterans Affairs, Housing and Urban Development, and Independent Agencies (VA-HUD), Sen. Mikulski has been instrumental in ensuring the vitality of the National Science Foundation's Informal Science Education (ISE) division. Since 1991, in large part because of her efforts, annual ISE funding has grown from $25 million to $62.5 million (estimated FY 2004).

Our second ASTC Fellow, Alan Friedman, director of the New York Hall of Science, was hailed as "a true leader who has pioneered creative ways to engage the public with science, demonstrated formidable advocacy on behalf of the field, and influenced and strengthened science centers worldwide." Modestly crediting many mentors and colleagues in his acceptance speech, Alan demonstrated why he has earned the affection and respect of museum educators around the world.

A pair of keynote speakers brought new perspectives from their fields.

ASTC Notes

"Red Hot, Cool & Green," an exhibit inspired by SMM's neighbor, the wood-burning District Energy St. Paul power plant (inset), was one of several wayside projects produced by participants in "Exhibit Graffiti," a preconference workshop organized by SMM's Chris Burda. *Photos by Carolyn Sutterfield*

On Saturday, we heard Michael Gartner, chairman of Vision Iowa and a supporter of the new Science Center of Iowa, due to open in 2004. The Pulitzer Prize–winning former newspaperman and one-time director of NBC News, masterfully wove seven short stories involving a French aerialist, a TV news anchor, a catastrophic vaudeville act, and more into a series of pithy lessons on forming alliances, having the courage of one's convictions, making time to listen, and being willing to take risks. (Access the full text at *ww.astc.org/conference/index.htm*.)

On Sunday morning, Dr. Catherine Verfaillie, director of the University of Minnesota's Adult Stem Cell Institute, reminded her listeners why it is so important to invite scientists into our museums as she took us through the history of stem cell research, touching on both the controversy and the promise of this "hot" field.

Although scientists try to communicate their work in an accurate and balanced way through public talks or newspaper articles or university courses, Verfaillie said, science centers also have a role to play. Displaying slides of an SMM exhibit on stem cell research, she noted that presenting information on such projects to children, families, and classroom groups in an interactive format "is a great way to bring these complicated scientific and also ethical issues to the public at large and have them get a better understanding of what it is all about."

In all, 14 distinguished speakers addressed the conference in individual sessions—too many for attendees to have caught them all. Fortunately, the talks were captured on tape and CD. To order them, or any of the nearly 100 conference sessions that were recorded, call 314/487-0135, or download the order form online at *www.astc.org/conference/index.htm*.

Taking care of business

The 2003 opening plenary concluded with the shortest—and perhaps the best attended—ASTC Annual Business Meeting on record. Outgoing president Walter Witschey introduced the association's new officers and board members, and ASTC committee chairs issued brief annual reports.

The 2003–2004 ASTC Board of Directors is more international than ever. Currently, 19 percent of ASTC-member museums are outside the United States, and the new Board echoes this proportion. Officers, who serve one-year terms, include President Per-Edvin "Pelle" Persson (Heureka, Finland), Vice President Lesley Lewis (Ontario Science Centre, Canada), Secretary-Treasurer Wit Ostrenko (MOSI, Tampa), and Member-at-Large Bill Booth (COSI Toledo). New directors, who serve terms of up to three years, include Erik Jacquemyn (Technopolis, Belgium), Gillian Thomas (Miami Museum of Science), and Dennis Wint (Franklin Institute). For a list of all current directors, go to *www.astc.org/about/astc/board.htm*.

Leaving the Board this year were Gail Becker (Louisville Science Center), ASTC's Immediate Past President since 2001, and directors Jim Peterson, former president of the Science Museum of Minnesota, and Bev Sanford, executive director of SciWorks. Walter Witschey remains active as Immediate Past President. ASTC is grateful for the leadership and generous service of all Board members, past and present.

Meeting attendees learned that the Board has updated ASTC's Strategic Planning Framework to guide decision making and resource allocation for the next 3-5 years. Strategic Planning Committee chairs Dennis Wint and Wit Ostrenko guided the process, which began with a two-day dialogue meeting in May, continued with discussion online, and concluded with a daylong meeting in St. Paul.

The new framework includes five strategic objectives:

- To measure and communicate the impact of science centers.
- To provide data and trends, new models, and best practices to enable members to manage more effectively.
- To facilitate, coordinate, and provide professional development and training.
- To position ASTC and its members as recognized leaders in public understanding of science.
- To provide tools and services that enable members to achieve sustainable equity and diversity.

In addition, a new Data Task Force, chaired by Kim Cavendish, will refine and expand information collection to help members strengthen their operations, and a new Science Center Impact Task Force, chaired by Pelle Persson, will define a program to document and communicate science center impact.

Achieving and sustaining diversity

The 2003 ASTC Conference marked the fourth anniversary of *Promoting Dialogues on Diversity:* the Conference Fellowship Program. Not only does this program brings new voices and perspectives to conference discussions; it also addresses the staff attrition issue often faced by ASTC members committed to achieving and sustaining a culturally diverse professional staff.

Six new fellows, selected in June by

an applications review panel, worked with seven Alumni Fellows through a preconference workshop, numerous conference sessions, a postconference debriefing, and even Sunday night's high-energy Caribbean Dance Party. (They hosted this fund-raiser, which was attended by approximately 250 conference delegates.) What emerged in St. Paul is a professional network that counters the sense of cultural isolation and limited opportunity frequently cited by professionals of color who move on to other fields.

ASTC Conference Fellows for 2003 included

- *Elgin Cleckley,* project designer, Ontario Science Centre
- *Ronnie Devine,* museum educator, Discovery Place (Charlotte)
- *Monika McFoy,* community relations coordinator, Buffalo Museum of Science
- *Lynell Moore,* reservations manager, Detroit Science Center
- *Valerie Rodriguez Oguss,* school programs coordinator, Kidspace Children's Museum (Pasadena)
- *Joanne Tashiro,* project manager, finance and information technology, The Exploratorium.

The seven Alumni Fellows who received funding were Cheronda Frazier, Juliet Gray-Moliere, Regina Hall, Rosita House, Stephanie Morrison, Charles Silva, and Mark Thorne. Also joining the group for some activities were Alumni Fellows Betsy Beredo and Jody Anderson. Like many of their peers, Beredo and Anderson served as leaders or presenters in sessions that offered opportunities for audiences to increase their competencies in working with diverse cultures.

Final wrap-up

As always, the Exhibit Hall was a veritable toy shop, full of wonderful ideas and products. Anchored by the ASTC Resource Area and NOAA's giant sphere, this year's array featured more than 140 booths. Business was booming, right down to the final moments of Sunday night's Exhibit Hall Dinner Reception. This new event allowed delegates to browse new and favorite vendors without missing session time.

Before long, we'll meet in San Jose for ASTC 2004, hosted September 18–21 by the Tech Museum of Innovation. Until then, we close this report with a special thank-you to our ASTC 2003 sponsors, especially major funders 3M, Natural History, Sodexho, Pioneer Press, Clear Channel Exhibitions, Exhibit Works, and Survey Works. From the bright conference totes to the many sponsored events to the final evaluations, we couldn't have done it without you.

And to our hosts at the Science Museum of Minnesota, hats off! You did a fabulous job—or as they say in Minnesotan: "It was a pretty good conference." Will we be back soon? Yah, sure, you betcha! But next time, let's make it in high summer. ■

NASA's giant Earth and Mars caught the eye from anywhere in the Exhibit Hall. *Photo by Bruce Cochran/Satellite Design*

Welcome to ASTC

The following new memberships were approved by ASTC's Membership Committee in May 2003. Contact information is available in the Members section of the ASTC web site, www.astc.org.

SCIENCE CENTER AND MUSEUM MEMBERS

- **Downing Planetarium,** Fresno, California. Located on the grounds of California State University, Fresno, the university-run planetarium plans to open a 5,000-square-foot museum addition, with hands-on exhibits, in late 2004.
- **Kansas Cosmosphere and Space Center,** Hutchinson, Kansas. An affiliate of the Smithsonian Institution, this hands-on museum of space exploration includes the Apollo 13 capsule, *Odyssey;* Gus Grissom's recently recovered Mercury capsule, *Liberty Bell* 7 (currently on national tour); and the largest collection of Soviet space program artifacts on display in the West.
- **Natural History Museum of Los Angeles County,** Los Angeles, California. Opened to the public in 1913, the 150,000-square-foot Exposition Park museum is second only to the Smithsonian in its collections of North American plants, land and marine animals, gems and minerals, archaeological finds, and cultural artifacts.
- **North Bay Area Museum,** North Bay, Ontario, Canada. This northern Canadian museum of science, history, and culture, founded in 1973, will move to expanded quarters later this year.
- **Owensboro Museum of Science and History**, Owensboro, Kentucky. A collection of live reptiles is a popular draw at this museum, which also features astronomy, geology, botany, archaeology, anthropology. and local history.

SUSTAINING MEMBERS

- **The Haizlip Firm,** Memphis, Tennessee
- **Exhibits, Inc.,** Burlington, New Jersey
- **The Mad Science Group,** Montréal, Québec, Canada
- **SEOS Limited,** West Sussex, England, U.K.
- **Teng & Associates, Inc.,** Chicago, Illinois.

Spotlights

By Carolyn Sutterfield

The centerpiece of the *Franklin Air Show* is the museum's restored 1911 Wright Model B Flyer. *Photo courtesy the Franklin Institute*

FABULOUS FLYING MACHINES, PART 1—As the first scientific organization to give Wilbur and Orville Wright credit for achieving sustained powered flight, the **Franklin Institute,** Philadelphia, enjoyed a special relationship with the Wright family for many years. When Orville Wright died in 1948, he bequeathed his aeronautical engineering collection to the Institute. So it was only natural that museum planners would celebrate the centennial of Orville's 1903 first flight with a new permanent exhibition.

The 5,000-square-foot *Franklin Air Show* immerses visitors in the simulated environment of a n old-fashioned air show. The exhibition includes more than 20 interactive devices in three environments: an aircraft hanger, a midway, and a pilot-training area. Visitors can explore the properties of air and the physics of flight, try their hand at simulated aerial maneuvers (including a 360-degree roll), and manipulate the controls of a 1948 T-33 Jet Trainer. They can also learn more about the Wrights and other aviation pioneers, including Bessie Coleman, Amelia Earhart, and the Tuskegee Airmen.

The centerpiece of the show is the museum's 1911 Wright Model B Flyer No. 39, the most intact of the brothers' surviving aircraft. Displayed at the museum from 1935 to 2001, the Flyer, complete with muslin-covered wings and working engine, has been meticulously restored for this exhibition by Dayton, Ohio's Aeroplane Works. One of the earliest mass-produced aircraft, No. 39 was the first plane to fly nonstop from Philadelphia to Atlantic City.

The exhibition was funded in part by the Institute's $60 million capital campaign, *Opening Young Minds,* which calls for eight new exhibitions opening by 2006. Additional funding came from the National Science Foundation and private and public sources.

Details: *www.fi.edu/tfi/exhibits/aviation.html*

FABULOUS FLYING MACHINES, PART 2—The initial phase of the Stephen F. Udvar-Hazy Center, the new addition to Washington, D.C.'s **National Air and Space Museum** (NASM) on the Mall, opened to the public on December 15 at Dulles International Airport, Chantilly, Virginia. Together, the two facilities comprise the largest aviation and space museum complex in the world. Shuttle buses will run from the downtown location to the new center, 28 miles away.

Phase one of the 760,000-square-foot complex includes the massive Aviation Hangar, the James S. McDonnell Space Hangar, the Donald D. Engen Observation Tower, a large-format theater, classrooms, and a museum shop and food court. Subsequent phases will add a restoration facility, object-processing and study-collection areas, and support buildings.

The aviation hangar contains some 200 aircraft on three levels. Highlights include an SR-71 Blackbird reconnaissance plane, a prototype of the Boeing 707, an F-4 Phantom fighter, and the B-29 Superfortress *Enola Gay,* the plane that dropped the atomic bomb on Hiroshima, Japan, in August 1945. Elevated walkways allow visitors to experience the sensation of soaring along with the aircraft and to study the artifacts in greater detail.

The Space Shuttle Orbiter *Enterprise* was visible for the opening, but the space hangar will not officially open for several months as the shuttle undergoes refurbishment and other artifacts are installed. *Enterprise* was used for approach and landing tests in the 1970s.

Architects for the project were Hellmuth, Obata + Kassebaum, St. Louis, Missouri, designers of the original NASM building.

Federal funds ($8 million) covered initial planning and design, but the remaining support has come from private and local government sources. The largest single gift, $60 million, came from commercial aircraft-leasing magnate Steven F. Udvar-Hazy. The Commonwealth of Virginia supported construction of the project's infrastructure. Total cost of the project is expected to reach $311 million.

Details: *www.nasm.si.edu/museum/udvarhazy/*

HOT AND HOTTER—*Climax,* a temporary exhibition that opened at **La Cité des Sciences et de l'Industrie,** Paris, in October 2003, uses sophisticated simulator programs to illustrate how the "greenhouse effect" created by carbon dioxide emissions may influence climate change on Earth over the next century or more.

Climax is organized in three sections. Projecting visitors into the year 2100, the first part shows in large-screen images the results of climate change at two extremes—if nothing is done to reduce emissions, and if decisions are taken now to limit production of CO_2.

In the second section, visitors view videotaped perspectives from 10 experts, including scientists, economists, and government officials, on the long-term effects of global warming. Among those testifying is French climatologist

A worker prepares the Crosley Flea for display in the Aviation Hangar of NASM's Steven F. Udvar-Hazy Center, October 2003. *Photo by Carolyn Russo/NASM/Smithsonian Institution*

Jean-Louis Etienne, who is currently engaged in research near the North Pole.

In the final area of the exhibition, a simulator—a kind of climatic time machine—allows visitors to manipulate variables to change the "future" for better or worse. For example, you might triple the number of cars in China, re-forest Northern Europe, or develop renewable energy sources in the United States. The results are projected onto the walls of the exhibition.

Climax is a collaboration between La Cité and the Dutch architectural and urban renewal agency, MVRDP. The exhibition is presented in English, Spanish, and French. Funding was provided by Gaz de France and ADEME, the French agency for environmental and energy management.

Running through August 2004, the exhibition is the first in a series of six planned at La Cité over the next two years, under the theme *Gérer la Planète* (Managing the Planet). Each will be accompanied by workshops, public debates, and special events.

Details: *www.cite-sciences.fr*

NATURE'S SECRETS—In 1903, when John Cotton Dana launched the forerunner of the **Newark Museum** (see "Museum-School Bridges," page 6) at the city's public library, , he allotted one room each to art and natural science. After the museum acquired its own building in 1926, curators accumulated more than 70,000 botanical, geological, and paleontological specimens. But when trustees undertook a $30 million expansion in the 1980s, there was enough funding only to renovate the art galleries. The natural science specimens were put in storage.

It took a new director, Mary Sue Sweeney Price, a decade of planning, and a $14 million capital campaign to bring to fruition the new Victoria Hall of Science, which opened one year ago. Its main attraction, besides a temporary exhibition space, is the 5,000-square-foot permanent exhibition *Dynamic Earth: Revealing Nature's Secrets.*

Combining dioramas with media presentations, touchable specimens, and interactive games, *Dynamic Earth* takes visitors from the Arctic tundra to an African plain to a tropical rain forest.

Study stations help visitors to *Dynamic Earth* explore the plant and animal life of Hank's Pond. *Photo by Tim Wintemberg/Newark Museum*

The largest exhibit is a 2,000-square-foot panorama of Hank's Pond in the Hudson Highlands, part of the city's watershed. A limestone cave contains a collection of fluorescent New Jersey minerals, stalactite and stalagmite, plus a population of live brown bats. Visitors can view a mastodon skeleton found in a glacial New Jersey lake and touch the creature's massive molar.

Major funders for the project included the Victoria Foundation, the City of Newark, and the State of New Jersey. Says museum director Price, "We're taking the old museum form, a specimen enclosed in glass, and turning it inside out, putting the visitors right inside the display."

John Cotton Dana would be proud.

Details: *www.newarkmuseum.org* ■

Grants & Awards

IMLS Grants Awarded

The Institute of Museum and Library Services announced its 2003 awards in October. The following U.S. ASTC members, arranged alphabetically by category, received IMLS funding. To learn more about these grant projects, visit *www.imls.gov.*

• *National Leadership Grants--Museums Online*
Field Museum of Natural History, Chicago, Illinois: $473,072

• *National Leadership Grants for Museums--Professional Practices*
Fairchild Tropical Garden, Coral Gables, Florida: $130,286
National Aquarium in Baltimore, Maryland: $197,000

• *National Leadership Grants for Libraries--Library-Museum Collaboration*
Burpee Museum of Natural History, Rockford, Illinois: $246,600
Children's Museum of Houston, Texas: $249,844
Henry Ford Museum & Greenfield Village, Dearborn, Michigan: $249,433
University of Oregon Museum of Natural History, Eugene: $240,894

• *Learning Opportunities Grants*
Ann Arbor Hands-On Museum, Ann Arbor, Michigan: $148,500
Avampato Discovery Museum, Charleston, WV: $74,267
Berkshire Museum, Pittsfield, Massachusetts: $100,000
Brooklyn Botanic Garden, Brooklyn, New York: $140,000
Brooklyn Children's Museum, Brooklyn, New York: $150,000
Catawba Science Center, Hickory, North Carolina: $63,246
Chicago Children's Museum, Chicago, Illinois: $150,000
Children's Museum of Portsmouth, Portsmouth, New Hampshire: $65,287
Creative Discovery Museum, Chattanooga, Tennessee: $105,908
Discovery Science Center, Santa Ana, California: $138,886
EcoTarium/Worcester Natural History Society, Worcester, Massachusetts: $74,870
Edgerton Explorit Center, Aurora, Nebraska: $81,000
Gateway to Science, Bismarck, North Dakota: $27,982
Grout Museum District, Waterloo, Iowa: $89,694
Hall of Health, Berkeley, California: $24,751
Lied Discovery Children's Museum, Las Vegas, Nevada: $150,000
Louisiana Children's Museum, New Orleans, Louisiana: $150,000
North Carolina State Museum of Natural Sciences, Raleigh, North Carolina: $150,000
Peabody Museum of Natural History, New Haven, Connecticut: $149,954
Philadelphia Zoo, Philadelphia, Pennsylvania: $19,658
Pittsburgh Children's Museum, Pittsburgh, Pennsylvania: $95,180
Rochester Museum and Science Center, Rochester, New York: $140,120
Sci-Port Discovery Center, Shreveport, Louisiana: $131,808
Utah Museum of Natural History, Salt Lake City, Utah: $149,059.

People

California artist and science exhibit builder **Ned Kahn** has received a prestigious MacArthur Fellow award. Known as the "genius grant," the fellowship awarded last October carries a cash prize of $500,000 over five years. Kahn, who has designed exhibits for many science centers and traveling exhibitions, including the currently touring *MarsQuest,* was honored for "recasting such forces as wind, water, and fire into forms that convey both the order and chaos of the natural world."

■ ■ ■ ■ ■

Kentucky's Louisville Science Center announces the appointment of **Arricka Dunsford** as director of marketing. Dunsford previously served in this position at the science center from 1992 to 1996. Most recently, she helped to coordinate the Kentucky Center's 20th Anniversary Gala.

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Charles O'Connor, vice president for exhibit operations at COSI Columbus, Ohio, announced his retirement from that position at the end of December. O'Connor, who was associated with COSI for 40 years, will continue to volunteer at the science center and at Habitat for Humanity.

■ ■ ■ ■ ■

The new director of the Carnegie Science Center is **Joanna E. Haas.** Most recently director of the Henry Ford Museum, in Dearborn, Michigan, Haas replaces **Seddon Bennington,** who left the Pittsburgh institution in late 2002 to become director of Te Papa, the Museum of New Zealand, in his native country.

■ ■ ■ ■ ■

After 16 years as head of the Colorado Museum Management Program, in Boulder, **Victor J. Danilov** has announced his retirement. Danilov, a former director of Chicago's Museum of Science and Industry, was a founder and early officer of ASTC, and the first editor of the *ASTC Newsletter.*

■ ■ ■ ■ ■

The Bay Area Discovery Museum, Sausalito, California, announces three new senior staff appointments: **Anne Marie Sanders,** as director of marketing and development; **Georgia Heise,** as director of programs; and **Gail Miller,** as director of finance.

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The new vice president of development at Discovery Place, Charlotte, North Carolina, is **Kara Newport Paige.** Formerly with the North Carolina Outward Bound School, Paige was most recently director of development at the Franklin Institute, Philadelphia.

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The Franklin Institute announces the appointment of **Donna Stein** as senior vice president for finance and administration. Stein joins the Institute from the Pennsylvania Academy of Fine Arts, where she worked as vice president for finance and administration.

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In March 2003, the New Jersey Association of Museums presented its 15th annual John Cotton Dana Award to **Emlyn Koster,** president and CEO of Liberty Science Center, Jersey City. Koster was honored for exemplary service in the museum world and for his leadership in service to the community. ■

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