ASTC Dimensions

Bimonthly News Journal of the Association of Science-Technology Centers

May/June 2005

Closing the Gap:

Reaching Female Audiences in Science Centers

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This issue was already planned when Harvard University president Lawrence Summers, addressing a January National Bureau of Economic Research conference on diversity in the science and engineering (S&E) workforce, set off a media storm. Speculating on why so few women hold high-level academic positions in S&E, Summers cited, in this order, the time commitment required in top jobs, different "availability of aptitude at the high end," and "different socialization and patterns of discrimination." Female attendees took offense, and Summers later apologized. Ironically, other presenters at that same NBER conference (see Web Resources, page 19) offered not only strong arguments for female intellectual ability in and commitment to science, but also suggestive evidence about gender bias and the challenges of S&E careers. What does all this have to do with science centers? Awareness of barriers is a first step toward changing a system that is insufficiently female-friendly. Next comes understanding of what does work for girls and women, and why. In this issue, we learn how museum professionals are addressing bias and developing programs that help female audiences make a positive connection with science.

Features

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A Bridge to Technology:

Designing a Program That Attracts Girls

By Linda Kekelis, Etta Heber, and Jeri Countryman

Look in on a typical high school computer programming class or science center robotics session, and you are likely to see a roomful of boys. These classes are not limited to males, of course, but the girls aren't there. Don't they want to learn about technology?

At Chabot Space & Science Center, we were offering a variety of technology-based classes for elementary, middle, and high school students, but girls weren't signing up. To find out why, staff arranged to meet with young women, aged 12 to 15, in our Oakland, California community.

From these focus groups, we learned that girls are indeed interested in technology—what doesn't attract them is the way it is usually presented. For example, they are interested in technology that serves a social benefit, but they don't perceive computer science as having this potential.

Based on this input, we came up with *Techbridge,* an after-school technology program tailored specifically to the interests of girls in grades 5 to 12. Now in its fifth year, *Techbridge* serves more than 250 girls in Oakland and nearby communities. Sponsors include the Gordon & Betty Moore Foundation, the National Science Foundation, and local business partners.

The power of personal contact

As we prepared to launch *Techbridge,* it was especially important that we reach out to girls who might not be inclined to enroll on their own. After all, even the most wonderful program won't do much good if girls won't give it a chance. So we went to schools that had signed up to participate and talked with girls during lunch.

As they assemble their LED kits, *Techbridge* participants at Washington Manor Middle School master new tools and learn how basic electronic circuits work. *Photo courtesy Chabot Space & Science Center*

What they told us echoed the concerns we had heard in our focus groups. Some girls didn't think they were suited for the program because they weren't "good at technology." Others had had a bad experience being the only girl in a computer class where speed and competition ruled. Lack of confidence and misconceptions about the lifestyle of computer scientists held some girls back; for others, technology just didn't seem compatible with their interests.

The key to recruiting these girls turned out to be reassurance from friendly *Techbridge* staff and a personal invitation from a trusted teacher. Promotional techniques like taking digital photos of the girls or passing out treats also helped create a "buzz" that got girls to take notice.

Techbridge sessions are held once a week at an elementary, middle, or high school site. A classroom teacher and a technical advisor from Chabot co-host each session. This is not a drop-in program. Experience has taught us that long-term participation leads to significant benefits, so we ask our girls and their families to make a yearlong commitment.

Activities are varied: One month the girls may learn HTML and create web pages; the next month they may take apart household appliances or fix the drives on their school's computers. Rounding out the program are field trips to work sites and visits with role models currently working in science and technology. These activities introduce the girls to different career options and inspire them to look into advanced classes and internships.

The program purposely includes

the people who are involved in the girls' lives on a daily basis—teachers and parents/caregivers. For teachers, we offer training, resources, and curriculum. For parents, we schedule events that celebrate their daughters' achievements and workshops that offer academic and career guidance.

Three keys to success

Because *Techbridge* meets outside of school hours, we thought hard about ways to keep the girls engaged. Three main ingredients make up our recipe for success:

• *Keeping it fun.* Hands-on projects allow the girls to master a range of technical skills. How many girls can say that they put together their own telephone? For *Techbridge* participants, it's often the first time they have assembled an electronics kit, but with teamwork each girl eventually has a working telephone she can keep.

To test their new phones, the girls line up to call home. The excitement they feel is matched by the amazement of parents who hear a daughter say, "I'm calling you on the phone I just made in *Techbridge*!"

Digital photography, another favorite activity, works well to engage girls who haven't had much computer experience. Focus, click, and upload—in a matter of minutes, a new user can experience success and discover an outlet for self-expression.

Once each girl has amassed a photo collection of people and places important to her, the group is ready to work on projects. Photo calendars become holiday presents, a digital quilt adorns a school bulletin board, and self-portraits accompany student biographies sent to career role models in advance of a visit. Photos also enhance digital stories about important issues like family, friends, body image, and relationships with boys.

• *Bolstering confidence.* Self-esteem grows out of working on projects that require problem solving and perseverance. Building a mechanical robot or soldering an LED kit may seem daunting at first to a girl who hasn't had the chance to tinker with tools or build with LEGOs. When the technology doesn't work right away, some girls are overcome by frustration and want to give up. But it is just such challenges that help girls believe in themselves.

We saw this the day our girls launched the kites they had spent a week designing and building. When some of the kites wouldn't fly or crashed after takeoff, we offered no easy answers. Instead, we encouraged them to trouble-shoot their problems using our cheat sheet. A single girl took up the challenge and modified the bridle point on the keel of her kite. One by one, the others followed her, trying to figure out the flaws in their designs. By the session's end, each kite had had a successful flight.

• *Managing the social dynamics.* Anyone who has worked with girls will tell you that relationships and group interaction are important to them. Because *Techbridge* reflects the diversity of our neighborhoods, it is especially important to build a sense of community quickly and to break up any friendship cliques or racial divisions.

To accomplish this, we start each meeting with a social activity. One week, the girls are paired and asked to find two experiences they have in common. The next week, they are invited to talk about their names. The lesson is that while names and backgrounds may be different, everyone shares some common ground, such as being named after a grandmother or liking soccer and math.

We pay careful attention to the social dynamics and partner the girls in ways that help them feel comfortable, meet success with technology, and practice teamwork. Initially, girls may not want to move outside their comfort zone, but with practice they come to appreciate the opportunity to be part of a *Techbridge* team.

A community of commitment

Although Chabot Space & Science Center is only a few miles from the homes of the girls we serve, many of the *Techbridge* families had never come to visit our exhibits or participate in our programs. We set out to change that by sponsoring family nights, complete with presentations by the girls, at both the schools and the science center.

At first, we relied on flyers to invite parents to these events. But when the RSVPs didn't materialize in the numbers we expected, we began calling the girls' homes. Just as personal invitations had turned out to be important in making girls feel welcome, the personal approach also turned out to be key to engaging families. The calls doubled our attendance numbers. One mother told us she hadn't thought the flyers about family events were meant for her. It had never occurred to us that someone might feel this way; the lesson was an important one.

As part of the *Techbridge* evaluation process, parents take part in interviews and focus groups, helping staff to better understand their own perspectives and better serve both parents and daughters. We find that the majority of families are eager to support their girls. In fact, some teachers have told us that the *Techbridge* family events, where our staff has the chance to meet and talk with families individually, are the best-attended events at their schools.

We also find that, after a school encounter, parents are more willing to come to the science center for *Techbridge*-sponsored events. Some families have even bought museum memberships, and one parent became a science center volunteer as a result of her daughter's participation in the program.

By connecting school with the science center, *Techbridge* truly serves as a bridge to science and technology for girls and their families. ■

At the Chabot Space & Science Center, Oakland, California, Etta Heber is director of programs, and Linda Kekelis and Jeri Countryman are project director and project coordinator, respectively, for Techbridge. *For more details, go to* www.chabotspace.org/visit/programs/techbridge.asp.

Barriers to Choice:

How Adolescent Girls View Science Careers

By Judy Koke

Three years ago, while doing some fairly standard evaluation work at the Denver Museum of Nature & Science, I uncovered what I considered a remarkable finding. When I asked students in the museum's summer teen program whether their participation would make them more likely to choose a science-related career, the majority of females said it would not. Their reason? "Because I'd like to have a family."

Obviously, the museum's programs were not addressing some key concerns of this audience. I was already familiar with research into the apparent decrease in interest in—and confidence about—the "hard sciences" (higher math, physics, chemistry, and engineering) among adolescent girls, as well as discussions of "female-friendly science" at the professional level (see Readings, page 19). I decided to explore this apparent barrier to girls' choice of science careers.

During the first four months of 2003, my colleague Gianna Sullivan and I conducted 30 focus groups with 277 8th grade and 11th grade girls in 15 Colorado towns. Sites included rural, urban, and suburban environments. Local teachers helped us identify an ethnically diverse sample of girls who represented a range of interests and ability in math and science.

School experiences

We began our discussions by talking about the girls' experiences in school. Both younger and older girls reported that they usually received better grades in mathematics and science (as well as other subjects) than their male counterparts. They attributed these achievements to the fact that they worked harder and took schoolwork more seriously.

The majority of 8th grade girls felt that math was the most important of their subjects because it prepared a person for daily life requirements, such as balancing a checkbook or getting a mortgage. By 11th grade, however, girls felt that continuing in math was less important.

"I like general math, which I think is helpful, but calculus—how are you going to use that in the real world?" asked one 11th grader. Commented another, "The fact that I know what the quadratic formula is off the top of my head—I feel that's just taking up extra brain space."

As sure as they were about their abilities, the girls drew a clear distinction between *internal* and *overt* self-confidence. Internal self-confidence was important to success, they said, but "bragging"—common in the more competitive boy culture—was not considered an attractive trait for females.

"It's hard to feel good about yourself around here because if you enjoy anything at all, everybody jumps on you: 'She's way too confident. She's bragging,'" said an 8th grade girl.

"You end up not sharing parts of you that you're good at," was an 11th grader's conclusion.

Both younger and older girls expressed the strong opinion that teachers and other significant adults in their lives had higher academic expectations for them than for their brothers. "It seems parents of girls will push their girls more.... They encourage them to do that just so they can get into college," said an 8th grader. An 11th grader commented, "Teachers expect girls to study more...[while] they expect boys to be more lazy."

When asked to explain *why* parents and teachers might push academic success more for females, girls explained that males have more routes to well-paying jobs. "A man can always get a job on the pipeline, or in construction," observed an 8th grade girl. "We need a college degree to get a job in a bank or in the hospital."

Career choices

The conversation then turned to career choices. As early as 8th grade, young women can articulate that significant adults in their lives reinforce the importance of choosing a job that can support a family.

"My mom taught me...I need to be able to support myself and my family—you can't depend on a guy being around," said one 8th grader. Added another, "My parents always told me that because the divorce rate is so high, why depend on someone else?"

When asked to describe what a "good job" was, young women initially mentioned a good income, but then quickly added that a good job also offered some degree of flexibility to accommodate the needs of their families.

Asked specifically about their interest in science careers, respondents were hesitant. They perceived science as a solitary and *(Continued on page 7)*

Building Girls: The Science of Home Improvement

By Kristie Maher

Trading Spaces, Design on a Dime, Landscaper's Challenge.... Television programs like these are incredibly popular these days—and not just with homeowners.

Surprisingly, one of the largest demographics watching the "do-it-yourself" shows is teens, especially teenaged girls. At the South Dakota Discovery Center & Aquarium, in Pierre, South Dakota, we have successfully tapped into the home-improvement craze to link teenaged girls with potential science, technology, engineering, and math (STEM) careers.

A *Building Girls* participant works on her shadow box frame.
Photo courtesy South Dakota Discovery Center & Aquarium

The science center already had a couple of existing programs open specifically to girls. The *Girls at the Center* (GAC) science discovery program, for girls in grades 4 to 12 and their adult partners, has about 100 student participants. But even with aggressive individual recruiting, the age range there is typically 9 to 11.

Our *SD Women in Science* team conducts conferences for middle and high school girls at sites across the state. The goal of this project is to "keep girls in the STEM pipeline," ensuring that they are taking related classes, developing their interests in STEM areas, and considering STEM career options. Recruitment is done through teachers, and more than 1,000 girls participate statewide each year.

Despite these efforts, it has not been easy to attract middle- and high-school-aged girls to our summer and out-of-school programs. The main obstacle is peer influence. If we can get one girl to sign on to a program, we can get 10. The trick is to convince that first girl that our program is not "for geeks only."

It took a look into the pop culture of Home & Garden Television to find a peer-approved approach that would work with young women.

We held our first *Building Girls* camp, funded by a grant from the Educational Foundation of the American Association of University Women (AAUW), in the summer of 2004. Our initial team of 12 campers, aged 13 to 16, took on the challenge of redesigning the playroom at a local preschool.

The girls' first job was to use basic construction techniques to build and decorate their own wooden toolboxes. Each toolbox was stocked with the implements its owner would need throughout the camp. At the end of the session, the girls got to take their toolboxes and tools home with them for continuing practice.

During camp, the girls met each day with a different professional from the construction and design industries to learn and practice skills they would need to complete the playroom project.

Early on, for example, an interior designer talked with them about how to design a plan that considered the needs and problems of a particular space. Together, the girls made a plan for the playroom, came up with solutions for problem areas identified by the teacher, and prepared a list of materials.

Later in the week, they toured a local building supply store to learn about its products and services and to see how the store was organized. Our goal was to increase the girls' comfort level in this environment so that after camp they would be able to use the store to access materials and carry out projects on their own.

Other professionals who came to the camp included an electrician, a painting contractor, a construction contractor, a landscape architect/designer, and a muralist. The girls also toured construction sites and land-

scaping projects at various stages of development.

After meeting each professional, they would do a project related to that person's line of work. The electrician guided them through a project in which the girls built their own bedroom lamps. The painting contractor and the muralist introduced them to painting techniques, which they then used to give an outdoor feel to the preschool room.

Building Girls was so successful as a camp that we decided to extend it. The program now meets once a month during the school year. Each session includes information on a particular construction career, as well as a goal-setting activity, and a project that adds to the girls' construction skills.

To date, the girls have created glass-covered shadow boxes (measurement, miter sawing, and glass cutting), stained-glass kaleidoscopes (glass cutting and soldering), and tabletop water fountains (plumbing and landscape design). All of these projects are designed to increase their comfort and skills with basic construction tools, introduce them to nontraditional careers for women, and build their self-confidence.

Recruiting for this program is not a problem; the girls do it themselves. Each month, one or two will get a friend to sign up. And their moms have become great "word-of-mouth" recruiters, too.

"I can't believe how empowered my daughter is," one enthusiastic mother told us. "She came home and started planning her own project right away. She is so thrilled with her new skills." ■

Kristie Maher is executive director of the South Dakota Discovery Center & Aquarium, Pierre, South Dakota; www.sd-discovery.com. *Partners in the* Building Girls *program include the South Dakota Department of Labor, The Right Turn Inc. (an alternative school), Growing Up Together (a program for single and teenaged mothers), and the Pierre–Ft. Pierre chapter of AAUW.*

(Continued from page 5) competitive endeavor that is lonely, innately inflexible, and unaccommodating of the competing needs of family. "If the school calls and says your kid's sick, you can't just leave in the middle of an experiment," said an 8th grader.

"I don't see women [in science careers] having children because there's so much time required for the job," said an 11th grade girl. "The schooling takes forever and...you have to go through a lot of years before you're at a really stable point in your life. So you just don't have the stability to prepare for children and a family before that point."

A surprisingly prescient observation that arose in many groups—frequently inspiring eloquent and mature discussion—was the question of whether a deep investment in one area of life detracted from one's ability to invest in other areas.

"I'm pretty sure that science is just a lot different from a lot of other jobs. You'd have to be, like, really passionate about everything that you do," one 11th grader said.

The young women discussed careers in medicine, law, or even education—singling out some of the teachers they had respect for. The question, as they saw it, was whether, if you really gave a lot of time and energy to the thing you're passionate about, you would have enough left over to be a good mother.

Working for a better world

The idea of passionate involvement carried over to our next discussion. When we asked these young women how they would like to learn about science, if they had the choice, they talked about real-world examples, about wanting to see science at work in their communities.

Great enthusiasm arose at the idea of science-related field trips—going one week to see a local veterinarian's office, and another week to see the water plant. They talked about wanting to understand the social and environmental implications of scientific work that is done—not just research for research's sake or for publication, but rather research to make the world a better place.

Girls express a strong interest in real-world, community-based science. *Photo courtesy Discovery Center Science Museum*

Science centers and other informal learning institutions, take note. Knowing that integration of career and family is a significant concern for young women, informal learning communities can design programs to address those specific issues.

Young women need to hear personal narratives about science and math careers that offer opportunities to address the double demands of career and family. They need stories that underscore where the collaborative opportunities in science are, and which careers might lend themselves to independent schedules.

This information, combined with the opportunity to experience hands-on science in engaging and socially relevant ways, may increase the number of young women who choose to participate in science-related higher education and careers. ■

Formerly manager of visitor studies and evaluation at Colorado's Denver Museum of Nature & Science, Judy Koke is now assistant director of the Colorado University Museum of Natural History in Boulder. *She wishes to thank the Chambers Family Fund, the Temple Hoyne Buell Foundation, and the Denver Museum of Nature and Science for their support of this project.*

A Welcoming Community:

Engaging Adult Females in Informal Science

By Dale McCreedy

Photos courtesy The Franklin Institute

Above, an NSP leader tests an anemometer project for her Junior Girl Scouts' Weather Watch badge. At right, by sharing a girl's curiosity about science, an adult serves as a mediator for her science learning.

Around the table were 21 women, participants in a Girl Scout leadership training program. They varied in age, background, culture, and ethnicity, yet all were drawn together by their involvement in scouting and by their commitment to leading—and training others to lead—hands-on science activities.

I began the session by asking each person to share why she had chosen to participate. Some expressed insecurities or deficits around science teaching or learning:

"I was told I couldn't do science as a kid because I was a girl.... I want to get to people that say no."

"I hear fear expressed by leaders all the time."

"I'm interested in switching [our] leaders from traditional arts and crafts to science."

"I always liked science but I never understood."

There were also women who had had positive, rich, and influential experiences in science and/or math:

"I am a scientist...and see myself as an exception."

"I come from a science family and have a science background myself.... It's important to tackle moms, since what they say is more important."

"I received important encouragement from the TFI [Franklin Institute] course that I didn't receive in other places... [and] want to encourage girls in the same way."

This sample of women's perspectives suggests the potential for action and empowerment available when we engage adult females in facilitating learning—even if it's in an area, such as science, where they are not necessarily expert. This is the focus of the National Science Partnership for Girl Scout Councils and Science Museums, commonly known as NSP.

A landmark program

Significant adults within children's lives—perhaps parents, teachers, or youth group leaders—have incredible potential to influence youngsters' confidence, achievement, and identity as science learners. However, it is likely that many of these caregiving adults, especially the females, have been confronted with experiences in their past that have discouraged them, that have made them more likely to promote science-shyness or resistance to science. And when the children they guide are also female, the challenge may be even more complex.

It was with this in mind that, in 1988, the Franklin Institute and two local Girl Scout councils, with funding from the National Science Foundation (NSF), piloted the "Girl Scout Leader Training Project." The program was intended to address science avoidance behavior in a group of adults critical to girls: Girl Scout leaders. The success of this pilot and its potential for national impact led to NSP, a longstanding partnership between the Institute and Girl Scouts USA, and a landmark gender-equity initiative for girls and young women in science.

NSP provides science activity kits, resources, and training for adult volunteers that correspond directly to badge requirements for Brownie and Junior Girl Scouts. The program uses a "train-the-trainer" model for dissemination within an individual site.

Funded by NSF from 1992 to 1996, NSP expanded outward from its original five museum-council partnership sites to include more than 70 sites nationwide. Sustained without outside funding since 1996, the program has just received a new NSF award (see "Longitudinal Impact for Girls," opposite page) that will support revision and dissemination of NSP materials.

We knew from the beginning of the project that to effect change in the girls' science experiences, we needed to understand the relationship to science of their Girl Scout leaders. We needed to engage these critical adults in the joys of science exploration and help them create identities as competent science learners.

Through study of active participation in NSP, I began to understand the ways in which informal learning environments, often thought to be marginal to dominant educational beliefs

and practices, could offer outsiders an entrée into both science learning and teaching.

One woman's transformation

The focus of this article is on capacity building—i.e., expanding the learning community in science to include broad-based female audiences. As part of my research on NSP, I conducted case studies of three women who became core members of the NSP community—each of whom had a different initial reason for becoming a participant, and each of whom benefited from and influenced the community in different ways.

This research drew on the work of socioculturalists Jean Lave and Etienne Wenger (see "Readings," page 19), who conceptualized and identified key elements of a Community of Practice (CoP). The CoP model suggests that as engagement and commitment grow, so does the level of participation—generating an "inward-bound trajectory" that has the potential to move from peripheral to active to core involvement.

This deepening involvement of participants often coincides with the development of new identities. In the case of NSP participants, these identities centered around science teaching and learning. I will focus here on one Girl Scout leader, a woman whom I call Virginia, who was transformed by her "inward-bound trajectory" within the NSP community.

Virginia was a woman who took great joy in sharing her path from science avoider to science advocate. In studying her, I was able to document her transformation from her first NSP experience more than a decade earlier, when she was a novice to science and Girl Scouting, to her current role as a leader of science learning in NSP and her council. The result is evidence of a powerful new identity in science.

Through her participation in NSP, Virginia developed a clear sense of herself as a learner; she had a growing understanding of science activities and the science behind them. But even more important was her emerging conviction that science was an integral part of all she did. She developed unique and spontaneous ways to investigate the world as a learner with a particular interest in science exploration.

In one interview, Virginia described the process that changed her perspective about science:

"A big part of it was my own background. I discovered that 'Hey, I can do this,' and I wanted other people to discover that too.…

"It is one of those things where…you start doing something and you notice it in other places. It has been very easy for me to…look at the science spin on things. I am much more inclined to say yes when my daughter says, 'Will you order me more magazines?' when they are Discover, *and* Backyard Nature, *and* Science Explorations.… *And the crafts that I do with younger girls are often things that will end up turning into a science [exploration].…"*

Over the years, Virginia, who continues to lead three Girl Scout troops, has influenced hundreds of girls, as well as other leaders. As she thinks about the high-school-aged girls in her troops, and looks back to the days when they were Brownies, the consequences of her sustained participation in NSP are evident:

"I actually started the science pieces because my older troop, the Senior Troop, has some girls that are very interested in science. I did that when they were at the Brownie level.

"So it's girls who, because I did science with them at the Brownie level, continued wanting to do more hands-on science and thinking it was (Continued on page 10)

Longitudinal Impact for Girls

What role do informal science experiences play over the long term in girls' interest, engagement, and participation in science communities, hobbies, and careers? The Franklin Institute and the Institute for Learning Innovation have just been awarded National Science Foundation funding to examine this question in-depth.

Five longstanding informal science programs for girls, begun 5–20+ years ago, will be the focus of the study. Four have been identified—the *National Science Partnership* (NSP), *Girls at the Center* (GAC), *Wonderwise*, and *Women in Natural Sciences* (WINS)—with a fifth yet to be determined.

Each project has access to girl participants, of high school age or older, who are diverse in race, ethnicity, and socioeconomic status. A Research Advisory Council (RAC) of nationally recognized researchers who have worked on gender projects, including the director or evaluator of each project studied, will ground the investigation and review the findings at each stage.

The long-term impact of participant experiences in these programs represents a treasure trove of potential data for the informal science education community. Museum educators will be able to use the information to better understand the impacts of programs they have designed specifically for girls.

This will be the first study of its kind. Previous grant-funded projects have mostly been evaluated for program effectiveness during the grant period alone, and these short-term results could not be generalized across projects. Findings will

- document long-term impacts of girls' participation in identified informal science programs;
- determine how informal contexts, in general, contribute to girls' science learning and achievement; and
- develop a model for understanding the impact of informal science learning initiatives.

We will document specific examples of informal learning experiences that support girls' long-term participation in science, as well as evidence of the types of influences—including significant adults and particular activities—that contribute to girls' trajectories of participation. We are eager to explore the role of informal science experiences in facilitating girls' science learning and engagement in science communities, hobbies and careers.

For further information, contact Dale McCreedy, mccreedy@fi.edu. —*D.M.*

A Scientist and a Scholar

By Kristine Molina

When I joined the *Upward Bound Math & Science Center* at the Miami Museum of Science in 1999, I knew that the training they offered would ultimately help me get into college. But it wasn't until I signed up for the center's BioTRAC program that I realized I wanted to pursue a career in science.

The *Upward Bound* program, along with its subgroups BioTRAC and Impact, is about reaching those students who have the passion to attend college, who want to do something big with their lives, and who want to bring science to others. Specifically, BioTRAC offers its participants extensive information about different fields of science, with an emphasis on biomedicine and biotechnology, and shows how researchers can bring about change through their work.

As an *Upward Bound* participant, Kristine Molina, above, conducted demonstrations at the Miami Museum of Science. As a Smith College psychology major, right, she gave poster presentations at national conferences. *Photos courtesy Miami Museum of Science, Kristine Molina*

I found myself intrigued by psychology. Although not considered a "hard science," psychology does incorporate the scientific method. BioTRAC showed me I could join psychology with biomedicine to explore new ways of conducting research.

But BioTRAC was not just about learning new things; the program also emphasized helping others to reach their goals. The close bond developed by my class helped give me the confidence I needed to become a role model for younger students and to develop a wide range of networks.

Presently, I am a senior at Smith College, majoring in psychology. While in college, I have had exciting opportunities to do research and to confirm my interest in a science career. My aspiration is to continue my studies in clinical psychology, with the prospect of attaining a Ph.D. and working as a university researcher and professor. As a Latina and a scientist, I want to conduct research that addresses mental health disparities in ethnic and underserved populations.

I believe that the mentoring and empowerment I received from *Upward Bound* and BioTRAC was just as important as my college studies and research in supporting my growth as an individual and a scientist. These two avenues have not only guided my scholarly work and service, but have also heightened my understanding of what it means to be part of the Latino community. I have learned that I can be a scholar, and that being a scholar is a powerful thing. I want to teach and do research, to empower and mentor, and, most importantly, to bring about change through my work in science. ■

Kristine Molina is a member of the class of 2005 at Smith College, Northampton, Massachusetts.

(Continued from page 9) *fun… and [it's] girls who discovered they were artists or other things, but still feel they have a foundation with science, so they can understand a little more about art….*

"Every now and then, the artist and I get in arguments about mixing colors and pigments and the science of all of that [here she laughs], *because she has enough of an interest in it…."*

Making a difference

There are many adults in children's lives, and most are neither trained scientists nor educators. As informal learning institutions, we not only have access to these influential adults, but also have the unique opportunity to offer experiences in science that can build capacity in ways that will expand the learning and teaching community in science.

Virginia's story is just one of many examples of the ways in which informal institutions, such as museums and Girl Scout troops, can engage and—in some cases—even transform women's sense of their own identity as gender advocates, as well as lifelong science learners and teachers.

Membership in such a community provides an avenue by which women who have suffered discouragement, gender bias, or a "disconnect" with science can feel empowered. As a result of this new engagement or reengagement with science, they may then learn to open the door to others.

NSP has been, and continues to be, a welcoming science community. ■

Dale McCreedy is director of the Department of Gender and Family Learning Programs at the Franklin Institute, Philadelphia, Pennsylvania. She is the co-author, with Tobi Zemsky, of Girls at the Center: Girls and Adults Learning Science Together, *a book about another Franklin Institute program for girls and adults (available through ASTC Publications, 202/783-7200 x140). Her article "Engaging Adults as Advocates" appears in the April 2005 issue of* Curator: The Museum Journal *(Vol. 48, No. 3).*

Social Science:

Observing Women and Girls in the Museum

By Dave Taylor

The underrepresentation of females at the highest professional levels in science and technology—at least in certain disciplines—is getting a lot of attention these days. In the science center field, we noticed a preponderance of males among our visitors early on, and responded by creating programming—camp-ins, scouting activities, computer clubs, and more—designed to arouse and support girls' interest in science and technology. That work continues to this day, and some of those programs are described elsewhere in this journal.

My interest in the interactions of boys, girls, and family groups in the museum was inspired by my former job as a designer of science center exhibits. In that role, I spent many hours on the museum floor, watching how different visitors interacted with exhibits and with each other. I came to recognize audience variables ranging from previous experience and knowledge of science and technology, to generational differences among children, adults, and seniors, to factors related to cultural background, social status, and an individual's role within a group.

I also began to see differences in the ways that men, women, boys, and girls interacted with exhibits and with each other. Ultimately, I entered a Ph.D. program, where I have concentrated on the differences between males and females as they learn science in out-of-school settings, particularly science centers. It is my theory, based on my reading and my personal observations, that the science and technology gender gap—at least in the United States—is not due to intellectual disparities, but is rather the result of the process by which our culture socializes its male and female children.

Exhibit seating that allows for collaboration is attractive to girls. *Photo courtesy Maryland Science Center/Human Body Gallery*

This article will describe three brief studies conducted in science museums and one done in summer science camps. In conducting this research, I used a variety of techniques: time and motion studies, interviews, and video recordings of interactions and conversations as I followed visitor groups. It goes without saying that each individual I observed is unique, and that none of my generalities will apply to every female (or male) museum visitor.

1. Time and motion at and between exhibits

In an early study, I used video cameras to record time and motion of approximately 400 individuals as they stopped at, moved between, and interacted with exhibits in a human biology and health exhibition.

Analysis of the tapes revealed that all-female groups tended to do exhibits together, often sharing a small seat if one was available, and seldom leaving the exhibit before all members of the group had had their turn. All-male groups would often move independently from one exhibit to another—occasionally touching base with other group members, pointing to a specific exhibit they had enjoyed, or sometimes going back to the exhibit together. Dads with young children usually stayed with the child at an exhibit. Mixed male and female groups were more varied in their behavior—except for couples, who also tended to stay together at exhibits.

2. Visitors and groups at a specific exhibit

This study, consisting of videotaping and follow-up interviews, looked at female, male, and male-female dyads and at mixed family groups—approximately 90 individuals in all—as they used specific exhibits in a physical science exhibition. Analysis revealed significant differences, depending on who was in the group:

(a) All-male groups tended to be interested in figuring out quickly what the task was and then making their performance a competition—who could do it best, fastest, and so on. Often a male would take a turn and move on to the next exhibit, leaving the other males to take their turn.

(b) Groups of females seldom, if ever, left an exhibit before all had had a turn. There was more social interaction between the females than in male groups. Females in dyads would often make a positive comment about what the other person was doing.

(c) In traditional family groups (mother and father with sons, daughters, or both), a pattern emerged. The children would always take their turn at the exhibit before the adults—the

boy usually pushing to be first and then running off to the next exhibit. The girl would generally go next, and then the dad might take a turn. Mothers often gave up their turn because the group was anxious to move on.

In follow-up interviews, I asked some mothers why they hadn't tried the exhibit themselves. The usual reply was that "we're here for the kids." If I persisted—asking what message this might be sending to their children about men's and women's roles—a light would often go on in the mothers' heads. Many women said that they had never thought of it that way before.

3. Family groups moving through an exhibition

To learn more about the dynamics of different parenting styles in families' use of exhibits, I followed individual family groups from the time they entered an exhibition until they left it, recording their conversations and movement.

For my analysis, I used several of the categories developed by Diana Baumrind in her 1970s work on parenting styles. The groups I observed fell into three styles:

(a) *Uninvolved parents.* Mothers and fathers showing this style would tend to follow along, initiating little interaction, as their children engaged exhibits. Some would even go off, find a seat, and people-watch, talk on the phone, or read a book while the kids used the exhibits. Males and females were equally likely to show this parenting style.

(b) *Directive parents.* Mothers and fathers showing this style tended to tell kids what to do or not do at exhibits. They were more likely to critique the children's performance or say, "Not like that! Do this." They would often lecture the kids on exhibit content. Males were more likely to use this parenting style.

(c) *Authoritative parents.* These mothers and fathers maintained their role as parents—for example, sometimes dissuading kids from leaving an exhibit without completing it—but also tended to share experiences with their children. They asked more questions, attempting to focus attention on a particular aspect of an exhibit. Questions I heard included "What do you think would happen if you tried this?" and "What do you think is going on?"

To expand a child's understanding or help to correct a misunderstanding, authoritative parents were also willing to say, "I think this is what's going on," or to point to a graphic and ask, "What does it say here?" Men and women were equally likely to use this parenting style.

4. Girls in mixed and single-sex camps

Over two summers, I did research and participated as a counselor in weeklong science camps—specifically, a geology camp and a marine biology camp—for children aged 12–15. In each case, I spent one week with a mixed-gender version of the camp and one week with an all-girls version. I observed approximately 75 children in all. Each version of the same camp had the same instruction, activities, field trips, and group playtime. Both male and female counselors, usually college students or recent graduates, staffed all camps.

In both types of camp, girls and boys showed little difference in their understanding of, or performance in, activities. What was different was how girls tended to approach these activities. In mixed-gender camps, when kids were asked to form smaller groups that would work together, girls would quickly form all-girl groups. They reported that this was to protect themselves from boys.

Camp activities tended to involve some sort of science project—comparing rocks, taking water samples, and so forth, and recording their findings. In mixed-gender camps, boys usually rushed to do the task, leaving girls to be the record takers, unless a counselor made sure everyone got a turn at both. Boys were also more likely to step in during girls' turns, saying, "You're not doing it right," and try to take over.

In single-gender camps, girls seldom needed prodding to make sure everyone got her turn. The girls were also much more supportive in their comments, finding something positive to say about what others were doing.

Overcoming cultural norms

One conclusion that emerges from this work is that, when it comes to doing science, girls are particularly sensitive to the expectations—expressed or unexpressed—of the adults and peers they interact with on a daily basis.

Within the family, mothers and fathers are major role models. When men are the doers in a science setting and women are the supporting players, children receive unspoken messages about behaviors that adults consider appropriate for them. Within mixed-gender groups of students, girls may feel overwhelmed by boys' competitiveness and find it easier to take a back seat, unless encouraged by adults to take the initiative. (Not covered in my research, but probably equally significant, is how girls are affected by their teachers' talk and expectations and by the media's portrayal of feminine roles.)

What can science centers do in the face of entrenched social and cultural norms? Here are a few suggestions:

- Use targeted programming to encourage mother/daughter visits.
- Train floor staff to encourage *all* visitors to participate in inquiry activities, not just the leaping boys.
- Have exhibit developers and designers observe as visitors use exhibits and discuss what they see.
- Create exhibits that allow visitors to work together, providing seating for two if necessary.
- Run an article on gender role models in the members' newsletter to raise awareness among parents.
- Make sure that staff is both gender diverse and culturally diverse.

Museum visits are a small part of visitors' lives and our impact is limited, but actively promoting science as a place for girls, as well as boys, is something we can commit to do. ■

Dave Taylor is the principal of AHHA Museum Services, Seattle, Washington, and a former director of exhibits at Pacific Science Center. He is pursuing a doctorate in cognitive studies of education at the University of Washington.

Women's Workshops at Miraikan

By Satoko Inoue

Today, females account for only 11 percent of science researchers in Japan. This is a very low rate for such a technologically advanced country. One reason may be that in our culture, mothers usually stay home to care for their children.

In the past, science museums have focused on providing educational science experiences for young children. Some have also designed programs specifically for teenaged girls. But not many have tried to share the joys of science with mothers and other adult females. At Tokyo's National Museum of Emerging Science and Technology (Miraikan), we decided to offer weekday science workshops aimed at women aged 18 and up.

Miraikan deputy director Noyuri Mima, who initiated the idea of the workshops, believes that there are no differences between women and men when it comes to learning science. "We women just missed the opportunity to explore science," she says. "Mothers who do experiments get the same enjoyment from it that kids do. Now they can communicate to their own children that science is fun and cool."

Our first two midday workshops were held on February 16 and 17, 2005. Each attracted more than 10 participants. The instructors were female, ensuring a comfortable atmosphere, but otherwise the content was the same as in our regular science workshops for upper elementary and junior high school students. The women ranged in age from 21 to 50, with most in their 40s. Mothers made up the majority.

The first session was a chemistry course called "Let's Make Diamonds!" Participants in the four-hour workshop were able to create their own synthetic diamonds based on methanol, a simple type of alcohol. A metallographic microscope allowed the women to view their synthesized diamonds, which were too tiny to see with the naked eye. Participants also learned about the many properties of diamonds.

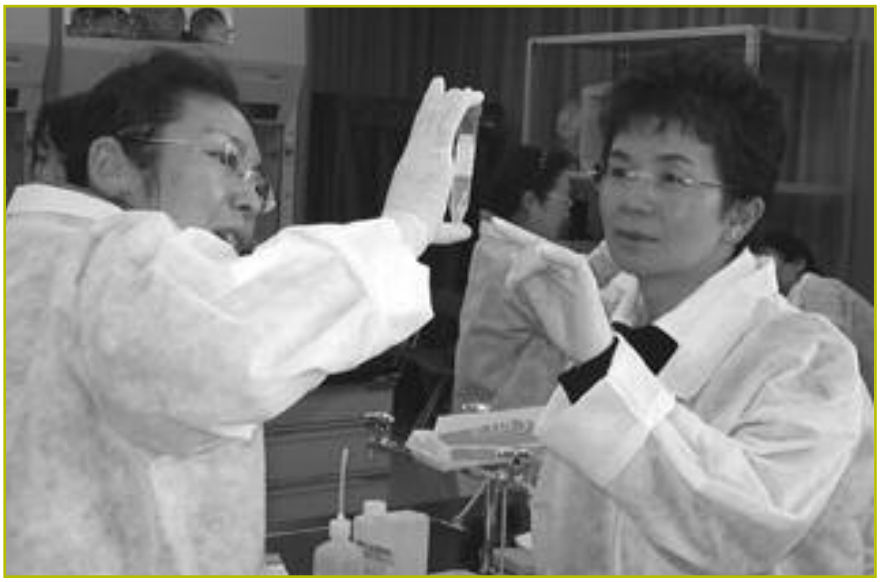


Photo by Satoko Inoue/Miraikan

Participants in Miraikan's "What's DNA?" workshop check their results.

The second workshop was a two-hour basic biotechnology course called "What's DNA?" Participants extracted DNA from a small piece of chicken liver. The experiment was kept simple so that participants could try it again at home with their families.

Both staff and participants enjoyed the sessions. Instructor Yoshiko Kono, who led the "What's DNA?" workshop, said, "All the participants were very enthusiastic and highly motivated. They did a pretty good job on a complicated experiment."

Comments from participants were equally positive. "I hadn't conducted experiments since my high school days, but I really enjoyed the program," said one woman whose son had told her about the workshops. "I didn't have to act as a mother in the laboratory. I felt like I went back to my student days and concentrated on the experiment." Said another, "When we are with our children, we have to pretend to know everything, and when we are with an adult male, we tend to act as an assistant." Written evaluations revealed that many participants had been waiting for an opportunity to take part independently in a science experiment program.

The February workshops were advertised only on Miraikan's web site, but still attracted a large number of applicants. The daytime scheduling seems to work well for this group, and we plan to offer more weekday workshops for adult female audiences. ■

Satoko Inoue is project coordinator in the International Development Division at the National Museum of Emerging Science and Innovation (Miraikan), Tokyo, Japan: www.miraikan.jst.go.jp

A Richer Vision:

Broadening Women's View of Technology

By Lena Embertsen

At Teknikens Hus (House of Technology), our stated mission is to stimulate interest in technology among all our visitors, and especially in girls and women. Knowledge is empowering. We believe that by broadening a woman's view of technology, we can get her past the point where she says, "I am not technical; I am not interested in technology. It is not for me."

From the beginning, Teknikens Hus has developed programs designed to engage girls and women in both science and technology. Activities range from in-service training courses for female teachers, to school workshops for pupils of all ages, to public programs, seminars, and temporary exhibitions. Developers focus on wholeness and context, using our region as a familiar starting point. Themes and contents are chosen to broaden key concepts, encompassing areas familiar to women and strengthening female technology in the eyes of both male and female visitors.

Two examples we are especially proud of—a temporary exhibition and a program for teenagers—will serve to illustrate what I mean.

Whose technology is it?

Count with Patterns was a temporary exhibition, produced in-house, that ran at Teknikens Hus from late 2003 through early 2004. The idea for the project came from a paragraph in *Sparks: Girls Are Not Like Other Boys,* a book produced by the National Museum of Technology in Stockholm:

"Construction and production of objects from flat materials—whose technology is that? You do a construction drawing; you cut out parts from flat material, following the drawing; and then you join them together to form the object.

"If the flat material is steel, it is obvious that it is technology. If the material is fabric, is it still technology? It is difficult to see any major difference in the production process, but easy to see our prejudices!"

A year earlier, we had built an exhibition that showed how rolled steel sheets made in Luleå's steel plant were used to produce parts for cars and trucks. That was a "male" technology involving flat materials. Now we felt it was time to make an exhibition based on quilting, a "female" technology that used flat materials.

In *Count with Patterns,* we were able to combine mathematics and technology in a way that made most females comfortable while making the point that quilting is technology. To highlight this idea and encourage reflection on common prejudices, we featured the quote from the book in the center of the exhibition.

We contacted the local quilting club and asked if they would collaborate. They were more than happy to comply. Not only did they lend us objects and teach us quilting techniques, but they also came and held workshops on the weekends. These events were extremely popular. The exhibition itself was very beautiful. More than 50 items featuring quilting techniques from simple to intricate were displayed, ranging from small objects to 2.5-by-3-meter (8-foot-by-10-foot) coverlets.

The mathematical aspect of the exhibition focused on geometrical figures. To complement the quilted objects, we added some mathematical problems of our own: a textile cubic meter with the challenge to squeeze as many visitors as possible into it; an exhibit where visitors could create a three-dimensional object, such as a football, by joining flat geometrical figures; another where they could create their own patterns with geometrical figures; and finally a game of "three in a row," in which players could use shape, color, and size to confuse their opponents.

To encourage visitors to look for geometry in the exhibition, we also created a worksheet with questions like these: *How many geometrical figures can you find in the different quilting patterns? How do you create the Japanese folding pattern that starts with circles and ends by looking like squares? How many stitches will it take to hand-sew a quilt 2 meters (6 feet) square, if you use 11 stitches per centimeter (26 stitches per inch)?*

About 15,000 visitors came to *Count with Patterns.* We hope they took away a better appreciation of women's mathematical and creative talents.

Engaging young minds

Our other example is *Young Minds—Technical Foresight,* a national project that has been highly successful in raising interest in science and technology among Swedish youth aged 13–19. Six science centers and museums in Sweden—the National Museum of Technology, Teknikens Hus, Malmo Museer in Malmö, Universeum in Gothenburg, Kreativum in Karlshamn, and Framtidsmuseet in Borlänge—collaborated for two years to jointly develop the method now being used in schools across Sweden.

The aim is to stimulate interest in science and technology among teens by encouraging them to create their

Photos courtesy Teknikens Hus

Along with more than 50 examples of handmade coverlets and other quilted objects (above), *Count with Patterns* offered workshops on quilting techniques and hands-on activities (right) that emphasized the mathematics involved.

own vision of the future.

Young Minds was designed to be appealing to both female and male teenagers; the program takes them seriously and gives them freedom to choose what to work with and how to show their visions. We chose four topic areas that we felt were of interest to both sexes—People and Machines, Biotechnology, Communication, and Environment. So far a majority of the females have chosen Biotechnology, but Communication is also popular.

Within their chosen topics, we ask students to look at their vision from many perspectives—technology and society, ethics, myself, power, equality, and so forth. Research has shown that females prefer function and wholeness to details; questions that girls like to ask include *Why is this technology good/better? How can this benefit me/society?*

Young Minds participants in Luleå come to Teknikens Hus to meet invited experts who can tell them about cutting-edge technology in their chosen area. The science center also holds an "inspiration workshop" on how to make a vision. Back in school, the students work on their topics for about six weeks. There is a *Young Minds* web site *(www.ungaspekulerar.nu),* where they can find facts and share ideas with others working on the same topic. At the end of this time, they come back to the science center and present their vision for other pupils.

The form this presentation takes is open, depending on students' interest and knowledge and the support their school can offer. We have had oral presentations with overhead projections or PowerPoint slides, posters, models, mini-debates, role-play, short films, and essays. At the program's end, the pupils attend a debate in which decision makers, such as politicians, ethicists, researchers, and corporate representatives, discuss a current hot topic in science.

This method—with its seminars, presentations, and dialogues between pupils, researchers, and other adults—encourages young people to look at technology from a critical point of view—to seek more information; to reflect, discuss and form opinions; and finally to create their own visions.

An evaluation of *Young Minds* by an outside researcher has shown interesting results, particularly for girls. One survey question we asked was whether students felt that the project had affected their interest in science and technology for the future. They could define themselves as having been "interested," "neutral," or "uninterested" before the project.

Twenty-five percent of the pupils said that they were interested already before the project, 46 percent were neutral, and 21 percent were uninterested. Girls formed the majority of the neutral and uninterested groups.

In their responses after the project, over 40 percent of the students already interested said they had become more interested. Among the neutral group, 53 percent said they had become more interested, and among the uninterested, about 30 percent had become more interested. (Teachers benefited as well, with 75 percent saying they gained new perspectives from the project.)

Comments also showed a change in girls' attitudes. "I see that natural and social sciences have more to do with each other than I thought," said one girl in secondary school. "Technology is much more than just car engines," said a high school girl. "Technology is also in people. It's thanks to [technology] that we are functioning."

Teknikens Hus is proud to be part of *Young Minds,* one of the most challenging and rewarding projects we have yet undertaken. We plan to continue working with the method after the project is formally ended. We will also continue to test and develop new exhibits and programs that encourage all of our visitors—but especially girls and women—to better understand the science and technology that shapes their lives today and tomorrow. ■

Lena Embertsen is director of Teknikens Hus, a science center in Luleå, Sweden: www.teknikenshus.se.

The Universe of Making Things:
Toward a Female-Friendly Technology

By Cornelia Brunner

Technology that is connected to their lives and interests has no trouble engaging girls. *Photo courtesy Chabot Space & Science Center*

At the Center for Children and Technology (CCT), a research group that began at Bank Street College and is now part of the Education Development Center, we have been studying for well over 20 years how to make new technologies really useful to good teaching and learning.

In the course of that work, we have paid close attention to a variety of factors that affect how people approach, use, and think about technology. One of those factors is gender. Some of what we have learned about female attitudes toward technology may be useful to designers of science center exhibits and programs.

Before I go further, I must issue a caveat. At CCT, we understand and use gender as a social construct, not a biological identity. Our work is based on many individuals studied over time. In analyzing our data, we have identified viewpoints and characteristics that we have, in the aggregate, categorized as *feminine* or *masculine voice.* By that, we do *not* mean *female* or *male,* which is a biological distinction.

As you read the following, please assume that when I speak of gender differences, I am never referring to biological males or females. It is quite possible for a man or boy to have a feminine "take" on any issue, and for a women or girl to be masculine in some of her thinking.

A baseline study

Early on, we noticed differences among our CCT staff (then about two-thirds female) in people's response to new technology. When a new computer arrived, the men would rip open the boxes to get at it; the women would wait to see "what it can do."

Curious about this phenomenon, we undertook a comparative gender study in the late 1980s with funding from the Spencer Foundation. We identified 80 male and female "power users"—experts in the technology of the time—and developed a series of questions and exercises to get at how these professionals had come to be doing what they were doing. Participants ranged from NASA scientists to filmmakers.

Over the course of the study, some significant gender differences emerged:

• *Career paths.* Many of our power users had had parallel careers, in terms of what they had studied and the kind of jobs they held. But in interviews, the men tended to describe their progress as a straight line, from deciding on a profession in their youth to achieving their current positions. Women, on the other hand, were more likely to have taken a circuitous route and report basing crucial career decisions on the requests and recommendations of others.

• *Role of mentors.* Both men and women talked about mentors in positive terms, but women more frequently reported that it was a mentoring relationship—particularly with a man—that had drawn them into their professions and kept them there.

• *Feelings about technology.* Men tended to make comments like "I like to think *into* the machine." They literally wanted to get their hands inside the technology. Women tended to look through the machine to the function, to what it could do for them in relation to their work.

• *Feelings about work.* Men were baffled by the question "What is it like to be a man (woman) in your profession?" But women had plenty to say, much of it revolving around types of conflict and what CCT came to call the "compensatory dance"—things they felt they had to do elsewhere in their lives to compensate for their interest in, and use of, technology. They didn't feel comfortable in this world.

• *Technological fantasy.* This turned out to be the richest area of investigation.

We created a computer program that prompted the user to spin out fantasies about ideal future technologies. A subgroup of 40 power users participated in this phase.

In general, women users tended to describe small portable devices that would somehow allow their owners to communicate, connect, and share ideas with other people. Their wish was that technology would bring people together. They used words like *creative, effective, sharing, integrating, exploring,* and *empowerment*. Women were cautious, however, about the limits of new technologies, expressing concern with what happens when you drop a new technology into an existing social, biological, and human environment.

Men tended to talk about what CCT labeled "magic wands"—technology that would allow its owner to instantly transcend the limitations of time and space. Their fantasies were not violent—one man wanted to be able to consult Gandhi, Einstein, or other great minds through a vast database. Nevertheless, their goal was to feel like more than an ordinary mortal. They used words like *control, power, speed, efficiency, autonomy, exploiting,* and *transcendence.* Men were more likely than women to have faith that "pushing the envelope"—i.e., inventing new technologies—was the right thing to do. If a machine they had invented created a problem, they believed they could invent another machine to solve that problem.

Putting principles to work

The methods CCT used in this early study of *masculine* and *feminine* perceptions of technology, and the powerful findings that emerged from it, have continued to inform our work. Two projects in which we developed technology specifically for girls can serve as examples.

Technological imagination

In 1998, CCT was invited to help the Australian Television Foundation (ATF) with their online children's

Women Guiding Women

By Traudel Weber

More than a decade ago the Deutsches Museum, in Munich, Germany, launched a gender-specific program, *Frauen führen Frauen* (Women Guiding Women) to open the richness of the museum to a female audience.

The idea grew out of a meeting held in 1986 at the Kerschensteiner Kolleg, the museum's vocational training organization. The main conclusions of that meeting, which was titled "Science, Technology, and Women," were that

- Women are underrepresented in science and technology.
- The museum has no specific offerings for women.
- To improve the interest and meet the needs of girls and women in science and technology, there needs to be some educational activity that matches their learning patterns and interests.

A female scientist, center, leads a tour for women at the Deutsches Museum, Munich. *Photo courtesy Deutsches Museum*

Museum educators recognized that, despite common prejudice to the contrary, many women do take an interest in science and technology. However, this interest often focuses more on the historical correlation between technology and scientific progress than on the technical data. Women want to hear about the social consequences of scientific achievements, as well as about the science.

With that in mind, female employees who worked as scientists or on the exhibition floors or in the workshops of the museum developed a program of guided tours designed "by women for women."

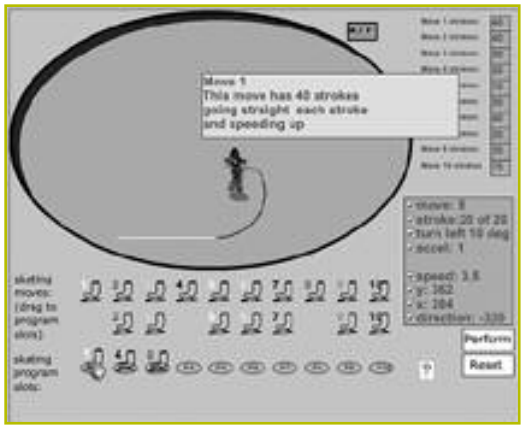
Frauen führen Frauen is now a tradition at the museum. Tours are offered on a scheduled topic once a week from October to May, and attendance varies between 10 and 50 per tour. Some recent topics have included "Life Is Chemistry," led by biochemist Andrea Wegner, curator of the museum's pharmacy gallery; "The Art of Constructing Bridges," led by engineer Barbara Siebert; and "You Always Dreamed of Flying," led by pilot Isolde Wördehoff.

Tour participants are encouraged to ask questions, contribute their own experiences, and express their reservations and worries. The format offers an opportunity for women to discuss topics of science and technology among each other in an easier and more open-minded way than a mixed-gender group might provide.

Besides the scheduled program described here, special tours can be arranged on request. A trip to Munich with a tour at the Deutsches Museum has become increasingly popular with charitable organizations and other women's groups.

To download a 2005 *Frauen führen Frauen* schedule (in PDF, German only), go to *www.deutschesmuseum.de/info/veranst/dmfff04_05.pdf.* ■

Traudel Weber works in the department of programs and museum education at the Deutsches Museum, Munich, Germany.



An ice-skating simulation challenges girls to develop their programming skills. *Screen shot courtesy Center for Children and Technology*

site *Kahootz*. This was (and still is) a web-based "universe" where children can have identities, talk to each other, and make and share animated creations. Among its wonderful tools were an innovative chat interface where everyone's comments popped up in cartoon bubbles around a central display, and some sophisticated but easy-to-use animation tools.

What happened was that boy users were creating inventions and putting them out into this world, but girls weren't making anything. They were just sending out invitations that said, "Somebody come chat with me." To help female users become more engaged, CCT developed a subworld of *Kahootz,* called Imagination Place, that would be more hospitable to girls.

We designed a free space for imaginative invention, including a patent office, a place where girls could fantasize about machines that would solve certain problems they were interested in. We had the computer generate open-ended prompts like *"I need a machine that would…."* (This inspired a lot of "Do my homework" responses.) *"Describe a machine the world forgot to make"* got the girls thinking about the world as a designed place: What kinds of things aren't in this world that we might need? One Australian girl, concerned with feeding the hungry, invented a "Dirt-to-Food Machine."

The next step was to help the girls create their inventions on-screen. We knew from our studies that very few young women see themselves as the future creators of monumental structures or breakthrough technology. Their fantasies rarely focus on building huge skyscrapers or fabulous vehicles, and they often lack opportunities to practice what we came to call "technological imagination."

Imagination Place, with its built-in animation tools, was a great place to encourage technological imagination. An animator has to think systematically about the relationships between form and function, between parts and wholes. This can be a powerful process for girls, who already enjoy drawing, labeling, and telling stories. The steps don't have to be realistic (there might be a "magical impulse" that goes from A to B), but there still has to be a sequence that must occur to make something happen.

Because they had not only generated good ideas but also thought through how to animate them, girls were more willing to launch their creations into the online world and invite others' discussion. The process successfully inducted young women into the universe of making things.

Manipulating parameters

In 2003, we did a project, with National Science Foundation funding, to introduce high school girls to ordinary programming skills. Nowadays, few girls study programming. It doesn't make sense to them. If you have applications that do everything for you, why would you want to learn how to program?

We decided on a simulation based on an ice-skating competition. The goal was to create a winning routine for your ice skater, following actual scoring rules of the sport. Now, building a routine that is challenging enough to get high scores but also physically possible for the skater requires two things: (1) understanding something about ice skating (which a lot of girls do), and (2) recognizing that there are parameters you have to take into account. Three spins may be doable; 18 may be too many.

Looking at parameters is the first stage of programming—the programmer opens a dialogue box and changes the variables. In our simulation, girls successfully brought their knowledge of ice skating and the real physical world to this phase. But after that, if they wanted to share with a friend a routine they had developed (and we know girls want to do that), they had to look at the code.

A programmer can't extract a routine directly from a dialogue box; she has to go down to the level of the code, identify the piece that does that, and copy it. When the girls approached the code structure this way, starting with a meaningful enterprise and recognizing how the code works in relationship to that enterprise, it made more sense to them.

Conclusion

There is much more to say about making technology more accessible to girls. Consider, for example, commercial video games, which currently reflect a "masculine" preference for competition and speed. Games like *The Sims,* which allow for differing styles of play, suggest crossover possibilities.

I believe that technology can recognize and support a "girl culture," a place where young women can try different roles, acquire new skills, and explore all the contradictions and complexity of being "feminine" in today's world. For further insight, I refer readers to *From Barbie to Mortal Kombat: Gender and Computer Games,* edited by professors Justine Cassell and Henry Jenkins of MIT (see Readings, page 19).

As you think about creating exhibits and activities in your museums, consider focusing a little more on the feminine side than the masculine, because that's the side that has been missing. ■

Cornelia Brunner is associate director of EDC's Center for Children and Technology, New York City; www2.edc.org/CCT.

"CLOSING THE GAP" RESOURCES

Readings

- Baumrind, Diana. "Current Patterns of Parental Authority." *Developmental Psychology Monographs* 4 (1971).
- Cassell, Justine, and Henry Jenkins, eds. *From Barbie to Mortal Kombat: Gender and Computer Games.* Cambridge, Massachusetts: MIT Press, 1998.
- Crowley, Kevin, Maureen A. Callanan, et al. "Shared Scientific Thinking in Everyday Parent-Child Activity." *Science Education,* Vol. 85, No. 6 (2001).
- *Designing Partnerships Between Science Centers and After-School Programs: Lessons from* Design It! *Engineering in After School Programs.* Education Development Center, 2002. Downloadable in PDF at *http://cse.edc.org/work/designit/default.asp.*
- Eisenhart, Margaret, and Elizabeth Finkel. *Women's Science: Learning and Succeeding from the Margins.* Chicago: University of Chicago Press, 1998.
- Jenkins, Henry. "From Barbie to Mortal Kombat: Further Reflections" (2001). Available at *culturalpolicy.uchicago.edu/conf2001/papers/jenkins.html.*
- Lave, Jean, & Etienne Wenger. *Situated Learning: Legitimate Peripheral Participation.* New York, Cambridge University Press, 1991.
- Linn, Marcia, and Sherry Hsi. *Computers, Teachers, Peers: Science Learning Partners.* San Francisco: Lawrence Erlbaum, Associates, 2000.
- McCreedy, Dale, and Tobi Zemski. *Girls at the Center: Girls and Adults Learning Science Together.* Philadelphia: The Franklin Institute/Girl Scouts of America, 2002.
- *New Formulas for America's Workforce: Girls in Science and Engineering.* Arlington, Virginia: National Science Foundation, 2003. Full report available online at *www.nsf.gov/her/hrd/ge/info.htm.*
- Rosser, Sue V. *Female-Friendly Science: Applying Women's Studies Methods and Theories to Attract Students.* New York: Teachers College Press, 1990.
- Rosser, Sue V. *The Science Glass Ceiling: Academic Women Scientists and the Struggle to Succeed.* New York: Routledge, March 2004.
- *Women, Minorities, and Persons with Disabilities in Science and Engineering.* Arlington, Virginia: National Science Foundation, 2004. Full report available online at *www.nsf.gov/sbe/srs/wmpd/start.htm.*

Web Resources

American Association of University Women
www.aauw.org
AAUW sponsors research on women's issues. Downloadable here in PDF are two reports on gender equity in science and technology: *Tech Savvy: Educating Girls in the New Computer Age* (2000) and *Under the Microscope: A Decade of Gender Equity Projects in the Sciences* (2004).

Association for Women in Science and Engineering
www.awise.org
AWiSE is a multi-disciplinary U.K. membership organization of individuals, businesses, associations, institutions and other organizations that share a common goal of advancing the interests of women in science, engineering, and technology.

Athena Project
www.athenaproject.org.uk
Launched in 1999, Britain's Athena Project serves the advancement of women to higher education positions in science, engineering, and technology. Preliminary findings of an Athena Project survey of more than 6,500 women scientists, conducted in partnership with the University of East Anglia, were presented at the 2005 AAAS meeting.

Canadian Association for Girls in Science (CAGIS)
http://publish.uwo.ca/~cagis/
Founded in 1992 by a 9-year-old Canadian girl and winner of the 2004 Michael Smith Award for Science Promotion, CAGIS is a network run by girls for girls, aged 7–16, who like STEM subjects and want to learn more.

Committee on Women in Science and Engineering
www7.nationalacademies.org/cwse/
A standing committee of the (U.S.) National Research Council, CWSE works to coordinate, monitor, and advocate action to increase the participation of women in science and engineering.

National Bureau of Economic Research
www.nber.org/~sewp/events.html
Click on the January 14–15 entry to access the agenda, bios, presentations (including a transcript of Lawrence Summers' talk), and readings from the conference "Diversifying the Science & Engineering Workforce: Women, Underrepresented Minorities, and Their S&E Careers."

Science, Gender, and Afterschool (SGA) Community of Practice
www.afterschool.org/sga/
This National Science Foundation–funded interactive forum is dedicated to strengthening the role of afterschool education in increasing girls' participation in STEM education and careers.

Women in Science, Technology, Engineering, and Mathematics ON THE AIR!
www.womeninscience.org
Available for listening online at this WAMC web site are *Her-Story: Then,* 26 two-minute pieces on women scientists and engineers through history, and *Her-Story: Now,* 13 segments on programs and projects that encourage young women to pursue STEM education and careers.

Calendar

THROUGHOUT 2005

World Year of Physics 2005: Einstein in the 21st Century. ***Details:*** www.physics2005.org

MAY

1–5 **2005 American Association of Museums Annual Meeting.** "Museums at the Crossroads." Indianapolis, Indiana. ASTC will sponsor a reception/dinner on Sunday, May 1. ***Details:*** www.aam-us.org

6 **Space Day (U.S.).** "Return to the Moon." ***Details:*** www.spaceday.org

13–14 **ASTC RAP Session.*** "Expanding Museum Outreach Through the Use of Multi-User Environments." Hosted by SciCentr.org, Cornell Theory Center, New York, New York. ***Details:*** Suzanne Kolodziej, smk@tc.cornell.edu

JUNE

2–4 **Canadian Association of Science Centres Annual Conference.** "Science from a Different Angle." Montréal, Québec. ***Details:*** www.canadiansciencecentres.ca/conferences.htm

8 **Math Momentum Workshop: Data.** Hosted by the St. Louis Science Center, St. Louis, Missouri. ***Details:*** Gloria White, gwhite@slsc.org

10–12 **ECSITE Annual Conference.** Hosted by Heureka, the Finnish Science Centre, Vantaa, Finland. ***Details:*** http://ecsite.ballou.be/new

JULY

21–22 **BIG Event 2005.** International Centre for Life, Newcastle upon Tyne, U.K. ***Details:*** www.big.uk.com/

AUGUST

2–6 **Visitor Studies Association Annual Conference.** Philadelphia, Pennsylvania. ***Details:*** www.visitorstudies.org

11 **ASTC RAP Session.*** "Physics—The Most Simplistic of the Sciences." Hosted by Utah Science Center, Salt Lake City, Utah, immediately following the annual meeting of the American Association of Physics Teachers. ***Details:*** Joe Andrade, joeandrade@uofu.net

SEPTEMBER

19–23 **GSTA International Conference and Trade Show.** Boston, Massachusetts. ***Details:*** www.giantscreentheater.com

26–Oct. 1 **Theatre in Museums Workshop.** Science Museum of Minnesota, St. Paul. Part I (Sept. 26–28) open to all; Part II (Sept. 29–Oct. 1) requires previous participation. ***Details:*** Tessa Bridal, tbridal@smm.org

OCTOBER

15–18 **ASTC Annual Conference.** "Partnerships for Excellence." Hosted by the Science Museum of Virginia, Richmond. ***Details:*** www.astc.org/conference

NOVEMBER

3–5 **Museum Computer Network Conference.** Boston, Massachusetts. ***Details:*** www.mcn.edu/

* *Information on ASTC RAP sessions is available at* www.astc.org/profdev/. *For updated events listings, click on 'Calendar' at* www.astc.org.

Melvill, Florida to Speak in Richmond

If you haven't yet marked your calendars for ASTC 2005, get out your highlighters. The 2005 ASTC Annual Conference is scheduled for October 15–18 at the Greater Richmond Convention Center, Richmond, Virginia. This year's theme is "Partnerships for Excellence: Seeking Strategic Relationships to Increase Our Impact."

Our 2005 host is the Science Museum of Virginia (SMV), housed in Richmond's historic Broad Street train station. Founder of four other Virginia science centers and an active member of a consortium of museums working to enhance Richmond's emerging cultural district, SMV is ready to share its experiences in developing "partnerships for excellence."

A key attraction of any conference is its speakers. This year, we are proud to have two keynote speakers of international stature. Sunday's keynoter is test pilot and astronaut Michael W. Melvill. On June 21, 2004, Melvill took aviation pioneer Burt Rutan's *SpaceShipOne* past the edge of space (above 62 miles) for the first time, earning his wings as the world's first commercial astronaut. He also piloted the first of two flights that earned *SpaceShipOne* the $10 million Ansari X Prize competition last October. When not airborne, Melvill works as vice president and general manager of Scaled Composites LLC, Rutan's Mojave, California aviation company.

Our Monday keynoter is economist and demographer Richard Florida, Hirst Professor in the School of Public Policy at Virginia's George Mason University. Florida's best-selling 2002 book, *The Rise of the Creative Class, and How It's Transforming Work, Leisure, Community, and Everyday Life,* won kudos for its detailed portrait of a new social class—the nearly 40 million musicians, artists, scientists, teachers, and other professionals (over 30 percent of the U.S. workforce) who make their living by thinking

Keynoters at ASTC 2005 will include economist and author Richard Florida, left, and *SpaceShipOne* pilot Mike Melvill. *Photos courtesy CreativeClass.org and Scaled Composites, LLC*

creatively on the job. His latest book, *The Flight of the Creative Class,* examines global competition for this new talent.

In addition to sessions on science center basics and fundamental professional development topics, the 2005 Annual Conference will explore the following themes as they relate to "Partnerships for Excellence":

- *Our audiences:* How do we identify and agree upon a common vision of relevance that is audience-based and community-responsive?
- *Learning strategies:* How can partners maximize each collaboration to further develop their own diverse learning strategies, work effectively with others in and outside the industry, and create value for themselves and for their community?
- *Current science and research:* What current science and research efforts have used creative, innovative, and successful collaborations to make significant contributions to public understanding of science and technology?
- *Technology:* What technological innovations have the most potential to help build successful partnerships?
- *Environment:* How can strategic partnerships shape and mold our communities' priorities, infrastructure, and thinking for an environmentally conscious future?
- *Marketing:* How do we give up control while preserving our own institutional identity?
- *Leadership and management:* How do we determine good partners, manage the risk, measure the impact, and create value in uncertain times?

Exhibitor's prospectuses for ASTC 2005 were mailed in late March. Contracts paid in full by May 6 qualify for a $50 early-bird discount, plus entry in a drawing for three nights' free hotel accommodations during the conference. Contracts paid in full by May 20 also receive the $50 discount.

For updated information on ASTC 2005, visit the conference pages at *www.astc.org/conference.* Early-bird registration for attendees will be due by August 12. We look forward to seeing you in Richmond this October.

New Appointments to Board, SCWC

ASTC's Executive Committee has appointed Board of Directors member Nancy Stueber, president and CEO of OMSI, Portland, to Member-at-Large, filling a vacancy created by Andrée Peek's retirement in December. Chevy Humphrey, president and CEO of Arizona Science Center, Phoenix, and Graham Durant, director of Questacon–The National Science and Technology Centre, Canberra, Australia, have also been appointed to fill other vacancies on the board until October, when newly elected members will begin their terms. The Leadership and Professional Development Committee has a new chair, Jo Haas, director of Carnegie Science Center, Pittsburgh, Pennsylvania.

The Science Centre World Congress (SCWC), held every three years, is coordinated by an International Program Committee comprised of representatives chosen by the major international science center networks.

The Ontario Science Centre, Toronto, Canada, will host the 5th World Congress in June 2008. ASTC has appointed three representatives to the committee for that event: Per-Edvin Persson, director of Heureka, the Finnish Science Centre and host of the first Science Centre World Congress in 1996; Wit Ostrenko, president of MOSI, Tampa; and Bonnie VanDorn, executive director of ASTC. ■

Welcome to ASTC

The following new members were approved by ASTC's Membership Committee in September 2004. Contact information is available in the Members section of the ASTC web site, www.astc.org.

SCIENCE CENTER AND MUSEUM MEMBERS

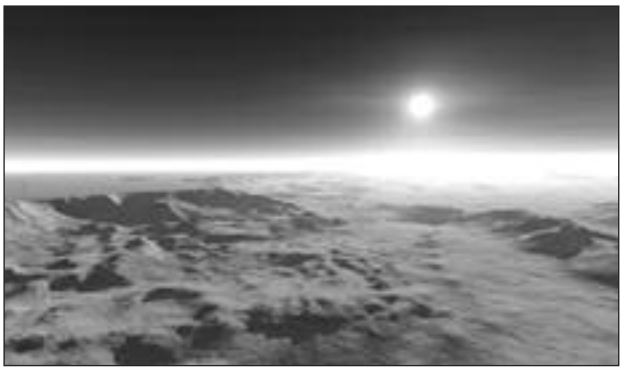
- **Ag Pavilion Learning Center,** Modesto, California. Still in development, this center dedicated to agricultural science in California's Central Valley is expected to open in 2007.
- **LIGO Livingston, LA,** Livingston, Louisiana. This small science center, due to open later this year, will be the public outreach arm of the California Institute of Technology's LIGO Livingston Observatory.
- **Santa Cruz Museum of Natural History,** Santa Cruz, California. Founded in 1905 and featuring an active volunteer program, this museum specializes in outdoor science experiences along the central California coast.
- **Science Timmins,** Timmins, Ontario, Canada. Inspired by a popular Science Fair, this northeastern Ontario "village" of eight topical huts, expected to open in 2008, will offer year-round hands-on science activities for all ages and teacher training.

SUSTAINING MEMBERS

- **Benee's, Inc.,** Farmington, Missouri
- **Dino Don, Inc. and Exhibits Rex,** Media, Pennsylvania
- **Odyssey Marine Exploration,** Tampa, Florida
- **ROTO Studio,** Hilliard, Ohio.

Spotlights

By Christine Ruffo



Audiences can explore red desert landscapes like this in *Mars 3D.* *Photo courtesy Science Museum of Minnesota*

OUT OF THIS WORLD—Was water ever present on Mars? If so, could life have existed there? Visitors to the **Science Museum of Minnesota** (SMM), St. Paul, can experience firsthand how scientists are answering such questions in *Mars 3D,* the first high-definition (HD) show produced by the museum for its new three-dimensional digital projection system.

Starting in early 2003, NASA, in partnership with SMM and Twist Films, began documenting its Mars missions in HD, using stereographic cameras on board Mars rovers *Spirit* and *Opportunity. Mars 3D* makes these images available for public viewing for the first time.

Narrated by NASA's Mars mission science team, the show follows the work of the scientists as they make decisions, uncover evidence, and discuss theories. The journey starts with the launch of the rockets that carried the rovers into space. En route, the audience learns about the rovers' capabilities and then experiences the drama of *Spirit*'s successful landing on the Red Planet. Next, the search for water begins, as both rovers explore craters and traverse red desert landscapes. Mike Day, 3-D cinema director and executive producer of the new show, summarizes his goal for the project: "Visitors will feel like they can get out of their chairs and walk onto the surface of Mars."

Mars 3D is the first production in the multi-year 3-D Visualization Initiative launched by SMM to bring immersive programming to audiences served by science centers.

Details: Mike Day, mday@smm.org

TINKERING AROUND—Creativity flourishes at the Children's Museum of Houston, in Houston, Texas, where *Invention Convention,* a temporary 1,500-square-foot, bilingual (English and Spanish) exhibition, opened on January 29.

Inside the exhibition's workshop, hands-on learning areas—filled from floor to ceiling with half-finished contraptions and bins of spare parts—provide everything young inventors need to design, build, and test projects like Aiming High (air-powered paper rockets) and Bug Traps. Any creation that doesn't perform as planned can be reworked at Back to the Drawing Board's chalkboard drafting tables. Completed inventions are ready for display in the Patent Office.

Facilitation for *Invention Convention* is provided by staff members dressed as "Tinker" and "Gizmo," inventor guides with contrasting creative styles: Tinker likes to plan each project in advance; Gizmo prefers to just jump right in. As children work on their inventions, the guides offer assistance or just the reminder that mistakes can lead to success, no matter what approach you take to inventing.

On display through September 18, *Invention Convention* is a prototype for a traveling exhibition that the Children's Museum hopes eventually to make available to other institutions. Funding for the $100,000 exhibition was provided by BJ Services Company, Houston Exploration Company, Moran Foundation, Rob and Ann McKee Family Foundation, and the Young Inventors Association of America.

"Tinker" assists young inventors in *Invention Convention.* *Photo courtesy Children's Museum of Houston*

Details: Danielle Vara-Aleman, public relations director, daleman@cmhouston.org

RAISING AWARENESS—Does science make headlines in your community? To address a lack of media coverage for science in Western Australia, ASTC member **Scitech,** Perth, partnered with the state's Office of Science and Innovation (OSI) to create a new web site, *ScienceNetwork WA.*

By providing easy access to science news and educational resources, the partners hope to increase public support for local science-related industry and encourage young people to pursue careers in science. Since its launch in November, *ScienceNetwork WA* has improved the ability of local government, industry, and education to communicate their work to a wider audience.

Features of the web site include:

- *Science News,* a homepage feature on Western Australian research, written by the network's full-time journalist
- *ScienceNetwork WA Journal,* a monthly e-newsletter promoting local scientific innovation
- *Ambassadors for Science,* a database of prominent scientists willing to share their expertise with local audiences
- *Careers in Science,* featuring science career profiles and a list of job search sites
- *Science Education,* formal and informal resources for teachers, parents, and students
- A calendar of regional science-related events.

Scitech's in-kind contributions to *ScienceNetwork WA* include web development, research, marketing, and promotion for the web site; OSI is providing $175,000 (US$139,000) in annual funding.

Details: Paul Nicholls, director of science education, Paul@scitech.org.au; *www.sciencewa.net.au*

VANISHING RESOURCE—The importance of water to all cultures and societies takes center stage in *Water for All (L'eau pour tous),* a new 3,500-square-foot, trilingual (French-English-Spanish) exhibition developed by **La Cité des Sciences et de l'Industrie,** Paris, France.

Sponsored by UNESCO, *Water for All* takes a closer look at the political, economic, and technological issues surrounding water and its distribution, and seeks to raise visitors' awareness of contemporary problems of water management. Partners in the 1.3-million-euro project include the Natural History Museum of Marseille, the Rhône Department Museum, the Pont du Gard Museum, and l'Espace des Sciences in Rennes.

The exhibition is organized in three sections. Visitors enter through Singing in the Rain, where, under sheltering umbrellas, they can listen to songs from around the world that recount the difficulties of access to water. Next is the Water Theater, where seven exhibits explore the unequal distribution and usage of water worldwide, the ecological consequences of human efforts to obtain and control water, and the political tensions that arise over shared water sources.

Finally, Enigma of the Future presents solutions proposed by scientific, economic, and political experts for preserving and sharing water. Visitors can take part in discussion about the future management of water, the rights of ecosystems, and equitable cooperation between nations, and vote on the experts' various solutions.

After touring the five partner museums, *Water for All* will begin travel to venues outside France in 2007. Advisors for the project, in addition to UNESCO, include the World Water Council, Biomérieux, and France's l'Institut de Recherche pour le Développement (IRD).

Details: Marie-Françoise Bosq, international development, mf.bosq@cite-sciences.fr; *www.cite-sciences.fr/eau-pour-tous*

In *Water for All,* a world map illustrates the unequal distribution of water in the world. *Photo courtesy La Cité des Sciences*

AN END AND A BEGINNING—After serving the Atlanta, Georgia community for 16 years, **SciTrek** closed its doors last August. Exhibits and physical assets were auctioned off. Says board co-chair Scott Coleman, "This was not an easy decision to make, but declining financial support for the existing facility presented an unavoidable reality."

The SciTrek name and spirit live on, however, at the new SciTrek Center for Science and Mathematics Education, opened in February at Valdosta State University, near the Georgia-Florida border. Although not open to the public, the center will provide hands-on science lessons to visiting school groups and train teachers to deliver similar lessons in their classrooms. Planned are two mobile science labs that will take programs to schools across the state.

SciTrek's former Challenger Learning Center (CLC) has found a new home at Atlanta's **Fernbank Science Center,** which currently educates 2,000 children each year at its NASA-based Science, Engineering, Mathematics, and Aerospace Academy. A $250,000 grant from Turner Broadcasting System paid for purchase and transport of the CLC equipment. The relocated Challenger Center, due to open later this year, is dedicated to the memory of John Holliman, longtime space correspondent for the Atlanta-based CNN news network. Another SciTrek program now housed at Fernbank is the Lockheed Martin Aviation Camp, a one-week subsidized day camp for rising 4th to 6th graders.

Details: Edward Finkel, public relations and media, ed.finkel@fernbank.edu ■

Grants & Awards

The **Shenandoah Valley Discovery Museum,** Winchester, Virginia, recently received one of 24 grants for capital projects awarded to arts organizations by Virginia's General Assembly. The museum's $450,000 award will go toward creation of its new facility, currently under development.

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The **Dallas Museum of Natural History Association** received $10 million from Hunt Petroleum to purchase a 4.66-acre site for its planned 150,000- to 200,000-square-foot Museum of Nature & Science. Ralph Applebaum and Associates will provide strategic analysis and direction for the project.

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The Boeing Company recently contributed $300,000 to launch **Space Center Houston's** Virtual Field Trip (VFT) and Distance Learning Program. The VFT is a mobile media cart that can capture images of live presentations and events at the science center for real-time transmission to locations around the world.

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Allstate Foundation has donated $76,200 to **OMSI,** Portland, Oregon to help fund an upgrade of the science center's Earthquake Room and development of the *Be Prepared!* computer-based kiosk exhibit on how to deal with natural disasters.

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The National Science Foundation has awarded $2.3 million to the TEAMS (Traveling Exhibits at Museums of Science) collaborative to support innovative research into how families learn in museums and to create four traveling exhibitions on communication, transportation, rotational motion, and the physics and mechanics of toys. Professor Kevin Dunbar, of Dartmouth College, is lead research scientist, and **Montshire Museum,** Norwich, Vermont, is project leader. Other partners include **Catawba Science Center,** Hickory, North Carolina; **Discovery Center Museum,** Rockford, Illinois; **Family Museum of Arts and Sciences,** Bettendorf, Iowa; **The Health Adventure,** Asheville, North Carolina; **Rochester Museum & Science Center,** Rochester, New York; and **Sciencenter,** Ithaca, New York.

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Verizon sponsored the recent installation of a MoPiX system in the IMAX theater at the **California Science Center,** Los Angeles. MoPiX makes movies accessible to visitors with hearing or visual disabilities.

People

Chabot Space & Science Center, Oakland, California, announces the appointment of **Robert Derbin** as director of finance. Derbin previously oversaw finance and budgeting for the five-branch Berkeley (California) Public Library system.

The Belmont Bay Science Center, Woodbridge, Virginia, has named **Lucy S. Beauchamp** as development director. Beauchamp, most recently director of the Prince William United Way, has also served as chair of the Prince William County School Board for 11 years. The science center, a division of the Science Museum of Virginia, is due to open in 2007.

The Trustees of the Berkshire Museum, Pittsfield, Massachusetts, have announced the appointment of **Stuart A. Chase** as executive director, effective March 2005. Chase is the former director of membership and community affairs at Pittsfield's Sterling and Francine Clark Art Institute.

Thomas C. Rockwell is the new director of exhibitions and programs at the Exploratorium, San Francisco. An artist, writer, and performer, Rockwell was most recently founder and president of the Painted Universe Inc., an exhibit design firm in Ithaca, New York. He replaces **Kathleen McLean,** an 11-year veteran of the Exploratorium and author of *Planning for People in Museums* (ASTC, 1993), who left the museum last fall to resume her museum consulting practice, Independent Exhibitions.

Barbara Sauer has joined the Rochester Museum & Science Center, Rochester, New York, as vice president for finance and administration. A lifelong resident of Rochester, Sauer was most recently vice president of AAA Western & Central New York.

The Maryland Science Center, Baltimore, has named former Bethlehem Steel division president **Van Reiner** as its new president and CEO. A science center board member since 2001, Reiner had served as interim director since September 2004, when former executive director and CEO **Greg Andorfer** resigned to launch his own business.

John Durant will assume the directorship of the MIT Museum, Cambridge, Massachusetts, effective July 1. Currently the head of At-Bristol, in Bristol, U.K., Durant served as the first professor of public understanding of science on the faculty of Imperial College, London, and was previously director of science communications at the Science Museum, London. As a member of the 1999–2000 House of Lords Select Committee on Science and Technology, he helped draft a major policy document on science and society in Europe. He replaces **Jane Pickering,** who left MIT in 2002 to become assistant director for public programs at Yale University's Peabody Museum of Natural History, in New Haven, Connecticut. ■

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