CHAPTER 3

EDUCATION Informal Science
Learning for the Public

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Building a Museum and an Educational Program, 1911–1954

In the 1911 annual report of the Colorado Museum of Natural History, which had opened to the public three years earlier, Director Jesse D. Figgins commented that the Museum could either settle for a place among the majority of like institutions or it could “join the few that are striving to attain their highest plane of usefulness by becoming centralized places of learning in all branches of natural history.” He went on to argue that a museum’s collections and exhibits should serve a larger purpose than scientific study or amusement; rather, they should be “of an educational character to benefit the masses,” although that aim had been considered by some to be “undignified and trivial.” Over the next 100 years, the Museum would respond in varying ways and degrees to Figgins’s bold challenge.

Figgins thought the Museum could be especially valuable to schoolchildren and their teachers. At the time, Museum staff delivered short talks to visiting classes on topics their teachers chose, but Figgins recommended developing a course of lectures for both the pupils and their teachers on the natural history of Colorado in order to teach “the importance of each species in keeping an economic balance, its relation to man and to stimulate an interest in biology.” He also recommended providing portable collections of specimens for use in the schools. Apparently Figgins’s 1911 recommendations were not immediately followed because in the 1912 annual report he again called for a series of lectures “as soon as possible,” noting that “of the museums which have attained prominence the Colorado Museum is probably the single exception in not having provided for public school classes and educational features other than those rising from the exhibits themselves.” The annual reports do not mention education again for several years, but we know that the Museum did develop a lending collection because the 1916 report speculates that a decrease in Museum attendance might be due to the popular use of these collections in the classroom.
The Extension Service

In the Museum’s very early days, its education program was loosely structured. That changed significantly in 1929 when committee members from Denver Public Schools, the Museum’s board of trustees, and Museum staff inaugurated the Museum School Service (commonly called the Extension Service), a cooperative venture between the schools and the Museum. Six traveling cabinets of taxidermied local birds and six of small local mammals were placed in the school district’s administration building to be circulated to the schools. The schools also approved funds for hiring buses to bring children to the Museum. Once there, the children would gather in a newly created classroom on the first floor (then called the basement) of the Standley wing to hear a staff member lecture on a subject relevant to the exhibits they would see. In 1929 the Museum reached 50,000 students through its classes and the loan collection.

Harold Cook, curator of paleontology, initially directed the Extension Service, but he soon resigned from the Museum, and in 1930 Robert Niedrach (Fig. 3.1) was placed in charge. Although officially a preparator and an ornithologist, Niedrach was an educator at heart. He loved talking to audiences and was good at it. Before taking over the Extension Service, he spent parts of summers with Boy Scouts at their Camp Lemen above Silver Plume and with Camp Fire Girls in Idaho Springs teaching nature study and outdoor work. He taught natural history to Boy Scouts at the Museum on Saturdays, and he was a willing speaker to school groups and civic organizations throughout the year. Not surprisingly, under his direction the Extension Service grew and improved. Class visits became more carefully tied to a teacher’s lessons, college and university students attended as well as younger students, and more specimens were added to the circulating collection, which was so popular the Museum could not keep up with the demand. In 1932 the Extension Service introduced a well-received series of public lectures in the evening, often accompanied by “moving pictures.”

Figgins soon recognized that the growing offerings of the Extension Service could not be sustained with current staffing. The Museum employed no one whose specific and primary responsibilities were education. Niedrach was primarily a preparator and ornithologist, just as Cook had been curator of paleontology. Staff who greeted and lectured school groups, who gave public lectures, or who in fact often made the films shown during these lectures had other primary Museum responsibilities. But staff acknowledged the importance of Museum education and shared in its achievements, an ongoing tradition that continues today as curatorial and other scientific staff are hired with the expectation that they will participate in and enjoy educational outreach. Yet for Museum education to flourish, it needed full-time attention.
In 1932 Figgins recommended hiring a manager for the Extension Service. That didn’t happen. Instead Niedrach and others continued and even increased their educational efforts. They gave talks and showed films in schools when transportation was not available to bring classes to the Museum, and they spoke to adult groups in the evenings, presenting the results, often on film, of the Museum’s expeditions. In two years Niedrach alone spoke to more than 35,000 adults.

Some help came in 1936. The Adult Education Council, a component of Denver city government, provided two teachers to give “guided lecture tours” of the exhibits to schoolchildren and general visitors on Wednesday afternoons during the school year; a year later one of these teachers, Eloise Fleming, was placed in a full-time position as a council-sponsored tour guide and the number of tours increased. H. Marie Wormington, curator of archaeology, supervised this effort. She developed scientific programs and written materials for students, plus a teachers’ guide to Museum exhibitions. Other staff continued to lecture to large audiences in schools, clubs, and scientific societies; in 1938 entomologist R. W. L. Potts reached 20,000 people, curator of meteorites Harvey H. Nininger spoke to 9,500, Niedrach to 4,800, and several others made smaller but still significant efforts.

The Museum’s annual reports of the 1940s and 1950s enthusiastically highlight the success of the lectures in Phipps Auditorium, and they include news of the Museum’s scientific and collecting expeditions, building plans, and exhibition gallery construction. However, they say little about education, and the section of the report titled “Education and Extension” was frequently omitted altogether. We know from a 1954 report that schoolchildren and their teachers continued to visit, but the report notes that where once various staff members had been delegated to guide them, “pressure of other work gradually made more than token help impossible.” That was about to change.

Figure 3.1. Robert J. Niedrach works on a mounted owl. Niedrach held various positions at the Museum from 1935 to 1970, including chief preparator, curator of birds, and assistant director. He managed the Extension Service in the 1930s, and in many other ways supported the Museum’s educational efforts.
From Phipps Auditorium to Phipps IMAX Theater: A Short History

In 1932 the Museum offered a program of evening lectures and “moving pictures of birds.” The largest lecture hall at the time held 150 people, only big enough to meet a quarter of the demand for these and other programs. In the annual report for that year, Director Jesse Figgins lamented the limited facilities and presciently noted that “the field for moving pictures and other forms of illustration is limitless.” Eight years later the Museum had a beautiful new auditorium, made possible through the gift of Senator Lawrence C. Phipps and Mrs. Margaret Phipps, for whom the auditorium was named (Fig. 3.2). The main floor held 750 seats, the balcony another 250. The stage had space for a concert organ and a 70-piece orchestra. The equipment in the booth was the latest in sound and projection.

The auditorium’s first program, which concluded the dedication ceremony on January 11, 1940, was Gorillas and Pygmies, a slide and film program given by Major Alfred M. Collins, a big game hunter and zoological expedition leader from Philadelphia. Eleven other film and lecture programs followed that year. The first two programs were lightly attended, and staff feared they may have overestimated the interest of the people of Denver and overbuilt an auditorium. But they need not have worried: from the third lecture on, Phipps Auditorium was unable to accommodate all who wanted to attend. In 1941 lecturers spoke twice on Sundays; by 1950 they repeated their lectures a third time on Monday evenings. For the first year, these adult lectures were free, funded by the trustees. In succeeding years, memberships
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were offered for seating on the main floor; balcony seats were open to the public. In 1942–1943, attendance to the film and lecture series was 44,455. Speakers were scientists, travelers, explorers, and photographers; many were staff, but others were from outside the Museum. In addition to this Film Lecture Series, the Audubon Wildlife Film Series, begun in 1945, offered five free films per year. By 1963, when the auditorium was 25 years old, nearly 1.3 million people had attended a film lecture or Audubon film program. Throughout the years other film and lecture programs were offered free of charge on Sunday afternoons in the summer or monthly during the winter. Saturday programs for children included educational or travel films, then two or three cartoons to interest the children in coming to the Museum, even if the visit wasn’t purely educational. When the Museum itself was not using the auditorium, it was available for civic meetings, concerts, dance recitals, and other community events.

In 1961 a disastrous fire gutted the auditorium’s interior; its quick restoration included improvements such as air conditioning. In 1970 the Phipps family donated a pipe organ. The most momentous change was proposed in 1981 and approved in 1982: a remodel of the auditorium, converting it into an IMAX-format giant-screen theater. The change was intended to stimulate attendance and revenue while presenting natural history in a new format. The plan was controversial, in large part because it appeared to threaten the existence of the popular Film Lecture Series, then more than 40 years old. The Museum assured its loyal audiences that the series would not be supplanted; it would continue in a different location during construction. (The series was relocated to South High School and Abraham Lincoln High School, but it never returned to the Museum, remaining at South High for another 13 years before it was discontinued.) On July 1, 1983, the new Phipps IMAX Theater opened with the film To Fly, which was enjoyed by 190,000 viewers during its run.

In 1991 the IMAX Theater was managed by the Education Division, which advised on the selection of films, with educational content as a primary criterion. The 1992 Rolling Stones to the MAX didn’t make the cut (but public pressure was considerable and persuasive: a few months later the film was included in the Best of IMAX Film Festival). In collaboration with other museums, the Museum invested in the development of the 1998 film Everest, a risky decision that turned out to be a good one. The film was the most popular IMAX film ever, produced a great return on investment, and presented an inspiring human story set in a demanding but breathtaking natural setting. Concurrent with the film’s showing, the Museum offered 41 educational programs, including the Hall of Life’s Physiology with an Altitude and a lecture by Sir Edmund Hillary. Although the seating capacity of the new theater was smaller than that of the old auditorium by more than half, it remains the Museum’s largest venue. With 400 seats and state-of-the-art technology, it is a desirable location for popular programs and speakers.

The most recent updates to Phipps Auditorium occurred in 2010, when the theater was briefly closed and refreshed with new carpeting, floors, seats, screen, curtains, a digital sound system, and the latest IMAX digital 3-D technology, including two new projectors. Offering popcorn to visitors was debated but finally decided against because of needed precautions against insect infestations that might threaten the zoological collections below the theater.

For most of its first half century, the Museum emphasized the education of schoolchildren through school visits or loaned specimens. Although Museum staff from various disciplines provided lectures or tours, and many did so capably and even passionately, ultimately education was not their priority. During these early years education competed for staff time with the Museum’s more pressing building and collecting activities. However, beginning in 1954 education in the Museum acquired a new status: it became prominent, permanent, and professional.

Denver Public Schools Partnership

We have Denver Public Schools (DPS) to thank: in February 1954 DPS placed its own teacher, Robert Thibodeau, in the Museum and provided his salary. Thibodeau conducted scheduled tours for DPS students Monday through Friday and made tape recordings to prepare students for their visits. He experimented with an assembly program in Phipps Auditorium during which students watched a narrated film on some aspect of Colorado natural history and then visited the appropriate exhibits. He included live animals among the Museum’s educational opportunities (a great horned owl was the favorite). Thibodeau stressed the importance of activities in the classroom following a Museum visit, and he encouraged repeat visits. He understood that the Museum had value beyond exposure to natural history; the visits also motivated learning in geography, history, English, composition, oral expression, social science, science, and even penmanship, as the students wrote careful thank you notes to Thibodeau. This focus on educational outcomes is evidence of a professional educator at the helm. Thibodeau was, of course, a public school teacher, but DPS took the welcome step of also preparing him in the field of museum education: DPS sent him to visit leading museums, and in 1956 he attended an American Association of Museums annual convention. Returning from that meeting, he reported on trends in museum education: the need for trained museum personnel, the importance of school-museum cooperation, and an increase in museum use of planetariums.11

In 1956 the Museum’s progress was consistent with these trends. With a professionally trained educator and school-museum collaboration, it also had a new planetarium. In 1955 the Denver Astronomical Society installed a Spitz Model A-1 projector in a small room on the Museum’s third floor under a 20-foot metal and fabric dome. The society’s members offered visitor programs throughout the year. Director Alfred Bailey hoped that this small planetarium would prove popular and thus demonstrate the desirability of a larger one in a future wing of the Museum. Eventually Bailey’s wishes came true, the reality perhaps even exceeding his dreams.
The Charles C. Gates Planetarium: A Time Line

1955: The Planetarium is erected on the third floor by the Denver Astronomical Society (DAS) and includes a Spitz Model A-1 projector (Fig. 3.3).

1956: DAS member William R. Van Nattan serves as curator and coordinator of the Planetarium, the Museum’s main visitor attraction. DAS members give 826 demonstrations of two shows: Star of Bethlehem and Trip to Mars; this number of performances is exceeded only by New York’s Hayden Planetarium. Visitors pay $.25 for adults and $.10 for children.

1959: Robert E. Samples becomes the Planetarium’s full-time curator. More and new programs are offered, still mainly by DAS members.

1960: Natural sounds are added to shows: for A Mountain Night, Assistant Curator Donald Lunetta records wind, rock falls, gurgling water, and dawn birdsong on Mount Evans.

1962: Samples resigns; Lunetta becomes curator. His expanded activities include giving general Museum tours to Colorado school systems outside Denver Public Schools.

1963: Planetarium shows are changed each month. Part-time staff is added, including Karen Noel. Martha “Marty” Hartmann becomes full-time assistant.


1968: The Charles C. Gates Planetarium is dedicated. Unique features are front-facing seats, video capability, and a television-telescope system on the roof. NBC’s John Palmer and Lunetta report live on national TV during the flight of Apollo 8.

1969: Lunetta resigns; Mark B. Peterson becomes curator. School tours are separated from Planetarium responsibilities and given to the new Department of Education. Total Planetarium attendance for the year is 109,120, of which students and teachers account for 24,883.

1974: Laserium, a multicolored laser light and music show developed by Laser Images Inc. of Los Angeles, is shown in the Planetarium, the second in the world to run this show. Immensely popular, it is seen by more than 40,000 visitors in 1974 and is “scheduled to run indefinitely.” The Museum agrees that the laser show is not a traditional planetarium feature, but it “allows a degree of financial flexibility to Gates Planetarium and DMNH.” A variety of laser shows, which eventually feature rock music and are held at night, appealing to a young audience, continue until 1998, when they are discontinued as being too far outside the scope of a natural history museum. The 22-inch telescope on the Museum’s roof is lifted by helicopter, loaded onto a truck, then transported to Jefferson County’s Outdoor Lab School, where it is used by the district’s school-children as well as the general public for many years during Museum-sponsored campouts at the site. During these years and for many years after, the Museum and DAS hold Star Parties on the west side of the Museum, complete with telescopes and astronomy experts.
1977: Museum staff produce original and innovative Planetarium shows in house, including one based on an Isaac Asimov short story, “The Last Question,” narrated by Leonard Nimoy, and Vision Beyond Time, narrated by Orson Welles. Aided by a grant from Columbia Pictures, Planetarium staff produce UFOs: Strangers in the Night? and distribute it to 40 planetariums in the United States and Canada.

1981: Supported by a Gates Family Foundation grant, Museum staff install a much improved Minolta Star machine mounted in a central pit and surrounded by seating in the round.

1984: Robert Wallace becomes Planetarium director.

1987: Stars of the Pharaohs is created in support of the Ramses II exhibition. The multimedia show features a life-size re-creation of Ramses from Abu Simbel and a temple at the dome entry.

1990: The school show Just for You invites teachers to customize certain presentations to fit the needs and interests of their classes.

1992: To complement the Aztec exhibition, the Planetarium produces Aztec Skywatchers, highlighting Aztec beliefs about celestial phenomena and their effects on daily life.

1994: Donald Asquin becomes Planetarium manager. He is followed over the years by Marta Lindsay, Larry Sessions, and Dan Neafus. All add shows and improvements.

1998: Gates Planetarium, along with seven others, produces the high-tech show Where in the Universe Is Carmen Sandiego? Actors in this interactive show invite the audience to solve a mystery using space science and scientific deduction.

2003: The all-new Gates Planetarium opens in June as part of Space Odyssey. New projection and sound technology, auditorium-style seating, and a stage encourage innovative, immersive programs, often produced live.

2005: Performer Kenji Williams premieres Bella Gaia, a live violin performance accompanied by a tour through the universe choreographed by space science curator Ka Chun Yu (Fig. 3.4).

2006: Black Holes is the first show presented in the new Planetarium that is produced by Museum staff and contractors. It is narrated by actor Liam Neeson and is now shown around the world.

2010: Cosmic Journey: A Solar System Adventure, Journey to the Stars, and The Little Star That Could are scheduled for school groups. The creative team of space scientist Ka Chun Yu and geologist Bob Raynolds offer Digital Earth each quarter to adults, during which they use the Planetarium’s technology to fly in from outer space to trace the routes of early explorers or to inspect the San Andreas Fault (Fig. 3.5).
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Education Becomes Official
Throughout the 1960s, DPS continued to provide a teacher to conduct Museum tours for its classes. When Thibodeau resigned in 1960 to become a school principal, Haysler Wieden took his place (Fig. 3.6). In 1967, when Wieden was promoted, Calvin D. Berglund became coordinator. Although not Museum staff per se, all three were essential to the Museum’s educational program. They educated hundreds of thousands of Denver schoolchildren and taught their teachers to use the Museum as a companion to their classrooms. Museum staff, however, could barely keep up with the increasing demands of a growing Denver, and they could do nothing for schoolchildren visiting from outside DPS. That job fell to Planetarium staff: Planetarium Curator Donald Lunetta, his assistant Martha “Marty” Hartmann, and others, who led school tours for the county districts in addition to their Planetarium duties. By 1969 Museum management saw the difficulty of that arrangement. They separated county school tours from the operations of the Planetarium and gave tour responsibility to a new Department of Education, with Hartmann as curator (Fig. 3.7).

The Marty Hartmann Years
Now with its own department, its own curator, and a small staff (including Dorothy Hodgkins, as assistant curator), education at the Museum blossomed. Thinking back on the 1970s, Hartmann offered several reasons for this rapid growth: staff support, classroom space, volunteer availability, and the improved standing of museum education nationally. 15

Hartmann speaks fondly of the Museum staff she worked with, only 30 to 40 employees, small when compared to today's staffing. She thought of her colleagues as a big family and remembers the support of directors, particularly Bailey, who would lead school tours himself when needed. As Hartmann recalled, “He did not stand on the dignity of his office as a director. His mission was education. And he’d get out there and he’d work with those schoolkids.”16 She also emphasized the support of Assistant Director Arminta “Skip” Neal and of Niedrach, who helped train her and Hodgkins. Hartmann explained that the staff “felt that we always had support for the education programs throughout the Museum with all the curators. They were always to a person very, very helpful. I think they saw us as their voice, because the Museum is as a whole an informal education institution.”17

When first established, the Education Department consisted of a couple of desks in a tiny room adjacent to the organ pipe room in Phipps Auditorium, hot in summer, cold in winter. But in 1970 the Museum added two new wings; though fiercely contested, the third floor of the northwest wing had not yet been assigned a use. Hartmann and Hodgkins, with the help of an architect, put in a bid. To their surprise the board granted everything they asked for: two state-of-the art classrooms, a storage room, and an
office. Now school groups could assemble in real classrooms equipped with laboratories, audiovisual capability, and cabinets of educational materials. Audiences other than school groups used the classrooms as well. Summers were especially busy. In 1971 the Museum and the University of Colorado offered a two-week workshop for teachers and three summer workshops for children. One classroom became a “touch room,” popular especially with preschool children, who could touch the mounted grizzly bear (Fig. 3.8), hold a 75-million-year-old fossil, or stick their hands into the gaping mouth of a giant mounted grouper fish. The growing collection of education specimens and materials could now be conveniently stored and could continue to grow. The collection proved especially useful in May when the large volume (of both bodies and noise) of schoolchildren made guided exhibit tours impossible. Instead the students, in a small, relatively quiet group, could handle natural history specimens or anthropological objects on a rolling cart. The “touch carts” appealed to everyone. Soon carts on all three floors were a regular part of the Museum experience, and they remain so today.

Hartmann and Hodgkins were very busy those first few years, building a department and a program and leading tours for students in suburban

Figure 3.6. Haysler Wieden, a Denver Public Schools teacher assigned to the Museum, speaks to a school group in the old Dinosaur Hall in 1965.
schools with help from the DPS teacher, who toured the city’s schools. In 1971, however, DPS informed the Museum that it could no longer staff its part of the program. In turn, Director Roy Coy responded that the Museum could not afford the additional staff person required to tour the DPS groups. These children could continue to come to the Museum, of course, but they could no longer have a staff-guided experience.18 This unfortunate standoff did not last long, for help soon arrived in the person of Eva McIntosh, along with eight of her friends. They wanted to be Museum volunteers. Hartmann convinced them to become tour guides for the DPS kids. Berglund, the DPS teacher working in the Museum, stayed all fall to train the guides, and in January 1972 they went to work. They were the first of the Museum’s formal education volunteers.
Volunteers

In a way, the Museum’s first educators were volunteers. Before “education” was part of anyone’s title, staff members from several departments and with varying backgrounds lectured, led tours for schoolchildren, wrote instructional materials, and assembled loan kits, all in the service of museum education. No doubt others from outside the Museum helped from time to time as well; unfortunately, their names have mostly been lost to history. We do know that in 1954 the Denver Astronomical Society constructed the Museum’s first Planetarium, and society volunteers presented public programs there for several years; members volunteer with the Museum’s astronomy programs to this day.

In 1971 Eva McIntosh and eight of her friends became volunteer tour guides for school groups. Curator of Education Marty Hartmann made sure they received training in both subject matter and methodology. McIntosh organized the group informally; they called themselves the HAGS, an acronym for the Honorary Association of Guide Services. The group grew over the years, eventually even including Director Bailey. The HAGS especially valued the Museum’s security guards who, by blowing whistles in the galleries, helped control the children. To thank them the HAGS treated the guards to a gourmet luncheon every year. The HAGS organization continued for some 20 years. In 2009 Coco Hackstaff, one of the original HAGS, received a Museum award for 40 years of service.

Other early volunteers were the instructors of the environmental education program WEBS, begun in 1976 and still going; its name refers to the ecological web of life. The volunteers for the Museum on Wheels program took slide programs and specimens to senior centers, hospitals, and similar facilities. That program too had a long life, ending around 2002 after nearly 25 years.

As volunteers in education increased in number, so did the opportunities to help. For years the volunteer Excursion Committee helped plan and lead field trips for adults; today the committee plans enrichment activities for all the Museum’s volunteers. Another committee staffs evening lectures. Middle and high school students work alongside teachers in children’s summer classes; in 2011 about 60 helped in this way. Interns and pre-service educators from area universities teach on-site school programs and workshops on a voluntary basis. Each morning volunteers search through storage cabinets of the education collection for the hands-on objects that will be used in programs that day. Late in the afternoon, they put them all back. Volunteers helped mount and prepare many of these same objects.

Perhaps the most ambitious, imaginative, and growing use of volunteers has been in gallery programs. Volunteers offer the popular Secrets of the Dioramas tours to general visitors, facilitate touch carts and other interpretive experiences in the galleries, and interact with children in Discovery Centers (Fig. 3.9). Volunteers have been important components of every temporary exhibition beginning with Ramses II in 1987. For the Aztec exhibition of 1992, 500 volunteers were specially trained to provide programs and activities in the exhibition.

Figure 3.9. A Museum volunteer encourages a child demonstrating during How Animals Walk, a popular gallery activity.
Every permanent exhibition, beginning with Hall of Life, included in its planning opportunities for interpretation. In *Prehistoric Journey*, for example, more than 100 volunteers currently talk to visitors at touch carts focused on life in the Paleozoic seas, dinosaurs, mammoths, and convergent evolution. Volunteers in *Expedition Health* engage visitors using touch carts, interactive exhibits, experiments in the Biology Base Camp lab, and other aids to the study of human biology. In addition to helping in the lab, some *Expedition Health* volunteers are integral to curator-driven research in health science. They are certified by the National Institutes of Health to work with human subjects to collect data for the genetics research that happens in this gallery. The certification process includes the study of protocols for human participation in scientific research, training on how to collect scientific health data from Museum visitors and how to educate them about genetics research, and, finally, a series of exams. These volunteers are citizen-scientists as well as educators. Their level of training is intense, but not that unusual for Museum volunteers involved with the public. Scientists from the research departments and Visitor Programs staff conduct this training, which can last weeks or even months.

The Museum as a whole could not function the way it does without its 1,800-plus volunteers. That is certainly true of the Museum’s various educational endeavors, which are assisted by, and sometimes only exist because of, its large and committed group of volunteers.

Hartmann and her staff often collaborated with educators at other cultural institutions in Denver—the zoo, art museum, and historical society—and they attended meetings and served on boards of regional and national museum associations. The 1970s were the museum world’s version of the wider world’s 1960s: old ways were challenged, new ways devised, and participants were active and committed. This creative turmoil was especially evident in museum education. Hartmann remembered the professional meetings as exciting: “They were loud and raucous and people could carry on. Educators were some of the worst. We carried on a great deal. We were very uppity, and we felt like we needed to have our place at the table. And it wasn’t just the curators of collections and the directors of exhibits anymore. It was going to be us, too. We were just as important, if not more important.”

Hartmann gave a lot of thought to the unique attributes of informal education when developing programs and training volunteers. She especially stressed the importance of using all the senses; among educational facilities, museums have a special advantage because of their collections—they have objects. Hartmann remembers, “I think there’s a tremendous power in the actual object, actually being able to pick something up and handle it and know it’s the real thing ... not an imitation ... not a reproduction ... the honest to gosh real thing.” Hartmann expanded the use of touch carts and loan kits and created the touch room. She encouraged the use of the inquiry method, whereby teachers avoided lecturing and used open-ended questions and other techniques to encourage children to think critically. PhD candidates in education completed projects or internships at the Museum and thereby supplemented the program too. One developed learning kits, another a “learning demonstration center” designed to test whether interactions in an exhibit hall with a facilitator and objects, including live animals, would affect the visitors’ use and understanding of the surrounding gallery. Apparently the results were positive; certainly they were long lasting. For many years the Education Department had a live animal collection, using it in one case for the popular Snakes Alive program for families. The use of an interactive experience in the galleries was even more durable; it continues today in nearly every gallery and exhibition hall.
Education Collection: The Touchable Museum

John Cotton Dana, the first director of the Denver Public Library, later founder of the Newark Museum, and well-regarded museum gadfly, once said something like this: “Fully one-third of all the objects now in museum collections should be loaned for educational purposes. If lost or destroyed they will have died in a good cause.”21 Not many museums would go that far, but perhaps the Denver Museum of Nature & Science comes closer than most. Its collection of objects accessible to the public is huge (37,452 objects in 2010), and its program has been studied and admired by many other museums.

In his very first report to the board of trustees, as part of the 1911 annual report, Director Jesse Figgins called for the creation of a portable lending collection of duplicate Museum objects for use by teachers in connection with nature studies, requesting $250 for support.22 When talking to visiting school groups, staff members used objects from their departments’ collections. Thus, from the very beginning of the Museum’s educational efforts, a hands-on collection was useful; collections are used in nearly every education program today. The collection and its use speak to the power of objects. There is no better way to assess the size of a grizzly, the softness of a beaver pelt, or the weight of a space suit than to explore these objects with one’s own hands and eyes (Fig. 3.10).

Throughout the years, the education collection grew rather opportunistically, with the department often acquiring objects because they were not suitable for the scientific collections. In some cases they were duplicates, in others they lacked the provenance required for research collections. Educators maintained the collection as best they could among their other duties. In 1990 the Museum hired an education collection manager, Jeff Stephenson, to establish professional operations and collection care. Stephenson and his successor, Richard Busch, have done just that. There are now criteria for accepting and retaining objects and specimens in the collection: they must be germane to the Museum’s core competencies and are accepted in consultation with the appropriate curator. Storage is more spacious, secure, and accessible than in the past. Recent grant funds support further improvements to storage and have allowed staff to better manage the objects. The end product is the best education collection in the country, and one that is uniquely appropriate to the Museum (Fig. 3.11).
By the time Hartmann resigned in 1978, the Education Department had grown to include five full-time staff members, several other part-time employees, and 71 volunteers. A third classroom was added in 1979; one of its first uses was for a five-week training course for volunteer tour guides. Although school attendance depended on fuel prices and bus availability and therefore waxed and waned, especially during the 1970s and 1980s, attendance for education programs reached 78,236 in 1976. There were programs for adults as well: teacher training, of course, and also credit and noncredit courses, some in cooperation with the University of Colorado and Metropolitan State College of Denver. Hartmann and her staff also developed a travel program for adults that began in 1973 with whale watching in Baja California. An outreach program, begun in 1978, reached people primarily in senior centers or nursing facilities who could not attend the Museum. In general, however, the department focused primarily on on-site programs for children, particularly schoolchildren.

The First of Many Rearrangements

In 1972 the Junior League of Denver founded the National Association of the Denver Museum of Natural History, dedicated to “more active public participation in the work of the Museum.” It began a Museum membership program, recruited volunteers for all Museum departments, and, in order to make new members and volunteers feel connected, organized many educational opportunities: behind-the-scenes tours, field trips, bird walks, geology hikes, lectures, exhibit previews and tours, and foreign travel. Hartmann helped out by serving on the association’s program committee; otherwise, most of the Museum’s adult programming originated outside the Department of Education. The association began as an independent organization but in 1978 became part of the Museum as a component of the new Department of Community Services. From then on members joined the Museum directly, with the department coordinating all events for members and other special events. A volunteer Members Council provided leadership and guidance for member and volunteer activities. In 1980 the Department of Community Services sponsored 7 major lectures, 26 programs or series of programs, 4 major special events, 33 field trips, and 14 receptions. Museum members went on 13 Museum-sponsored trips to such places as Cozumel, Machu Picchu, the Smithsonian, the Grand Canyon, and China. Mary Leakey spoke, and Ansel Adams would have too had he not cancelled due to illness. The Education Department, directed now by Hodgkins, was equally ambitious. In 1982 program attendance reached its highest numbers yet at 146,745. In addition to school tours and summer programs for children and educators, the department had broadened its audience to include the general adult public for whom there were also tours as well as daytime and evening lectures and summer programs. From the distance of time, the
programming responsibilities of the two departments seem to overlap, but the distinction between the two may have been clearer at the time.

The next few years saw several reorganizations and realignments of responsibility. In 1985 the University of Denver awarded the Education Department its Phi Delta Kappa Award for Lay Educators for its contribution to public education. Ironically, a discrete Education Department no longer existed. It was part of Community Services, managed by Diana Lee Crew and staffed by a secretary and two education assistants but no education curator. Changes were brewing, but they were good ones. The Museum made two important decisions in 1985: one was to support the establishment of a tax district (eventually named the Scientific and Cultural Facilities District, or SCFD) to benefit the metro area’s cultural institutions, and the second was to merge the Hall of Life, a health education center, into the Museum’s operations. These two decisions were appropriate conclusions to the preceding 30 years of ambition and achievement in Museum education, and they promised innovation to come.

Innovation, Growth, and Leadership,
1987–Present

During the first 80 years of the Museum’s history, its education function rose and fell depending on priorities established by leadership and also no doubt on economics, as education programs are almost never self-sustaining. Education has fared well during the last 20-plus years. SCFD funding, first dispersed in 1989, has benefited Museum education ever since. In 1987 John Welles, a strong supporter of education, became the Museum’s director. Museum education also benefited from the incorporation of the Hall of Life, which brought with it innovative instructors and programs, an exhibition focused on the audience as learners, and a project director, James H. Goddard, who before long would lead a new Education Division into even larger territory.

The Hall of Life
The Hall of Life was a health education center founded in 1975 and located in the basement of the Blue Cross-Blue Shield building in downtown Denver. Because schools lacked funding and mandates for health education, the Hall of Life filled the gap with exhibits and classroom programs. By 1985 it needed more space and a greater public presence. At the same time, the Museum had added two new wings and was looking for content. With the Gates Family Foundation as matchmaker, the two organizations found one another; they, in turn, found Goddard, whose role was to effect the merger, raise funds, and help design classrooms and exhibits for what was soon to
become the largest hands-on museum health exhibition in North America. The first phase of exhibitry would not open until 1989, but programs for children began in 1987, conducted by Hall of Life’s educators, who taught sensitive topics such as AIDS prevention and tobacco awareness. Some of the health classes, like their natural history counterparts, were dynamic and object based. For example, in Move It, a 1988 summer workshop, children dissected chicken wings to see how muscles and bones worked together. Children in the 1989 You’ve Got Guts program manipulated the organs in a human body (Fig. 3.12).

Changes and More Changes
Welles created the Education Division in 1989, with Goddard as the division’s director. Goddard’s two managers were Sue Palmer for the Hall of Life and Diana Lee Crew for natural history programs. Palmer had responsibilities for the exhibition as well as for youth health programs. Crew’s duties included youth programs, teacher professional development, an ambitious travel program, and soon the Jason Project and participation in the publication of the Museum’s first children’s book, *The Wonder of Wolves*.

Eventually there were four program areas in the Education Division, each with its unique audience: Visitor Programs, Adult Programs, Youth and Teacher Programs, and the Planetarium. The IMAX Theater operation was later added as well. Each program would grow over the next 25 years, although progress was not always straight and smooth. Perhaps the bumpiest times were during the tenure of Director Raylene Decatur, when efforts were made to reduce costs and consolidate operations. By 1995 Goddard made the difficult decision to end the popular Film Lecture Series. The longest-running Museum program to date, it was nearly 60 years old at the time and had a large and loyal audience, but it was showing its age and was not consistent with the Museum’s strategic direction toward science-rich programming. The Museum’s travel program fell victim to economic realities: international travel, which served relatively few people, was first outsourced and then suspended, and the domestic travel program was greatly reduced. By 2002 Hall of Life education was no longer a separate entity, its programs and staff combined with its natural history counterpart. In 2004 all on-site classroom programs for children were eliminated, although they were brought back two years later when the school tour program ended.

In 2001 Goddard left the Museum, perceiving that the education function had lost its priority as evidenced by a reorganization that removed the...
director of education from senior staff. He was succeeded for several years by Ron Rohovit. By 2011 there was no Division of Education, the traditional functions folded into the Division of Strategic Partnerships and Programs, led by Vice President Bridget Coughlin and two directors: Polly Andrews for Youth and Teacher Programs and Nancy Walsh for Museum Programs (Adult Programs and Visitor Programs). Thus organizational shuffling continues, but the three programmatic departments are thriving, and the current structure allows for easy collaboration among them.

Visitor Programs

Early in his directorship, Goddard hired educators in the Museum’s core competencies to help develop educational programs and exhibit interpretation and to train volunteers. In planning exhibitions, these educators joined Goddard in an arrangement known as “the triad”: a partnership of education, exhibits, and research staff. Educators continue to be intimately involved in the creation of permanent as well as temporary Museum exhibitions. As members of the Visitor Programs staff, led for many years by Rebecca Smith, they make sure that the needs of the audience are met and that the exhibition exemplifies the best practices in informal education. That done, they then add the creative activities for which they are known.

Beginning with the blockbuster *Ramses II* in 1987 and soon followed by the Hall of Life, Museum planners made sure to include interactive elements to enrich and enliven the exhibition experience. Goddard had seen gallery presentations at science museums and zoos and was particularly impressed with the performances of Eddie Goldstein at the National Zoo. In 1992 he hired Goldstein to head a new Gallery Presentations Department (later reorganized as part of Visitor Programs) with the mission to “get
acceptance of presentations in the previously contemplative environments of the wildlife diorama halls.” Goldstein produced his first interactive activity for the 1992 temporary exhibition Aztec: The World of Moctezuma, an interactive Aztec calendar whereby visitors could compute their birthdays in Aztec time. Soon he added more elaborate performances, and in 1994 the Museum built a demonstration stage where Goldstein and other staff and volunteers included visitors in such programs as How Animals Walk, the Camouflage and Deception Quiz Game, and the physics lesson The Pressure Demo, which featured a bed of nails.

During Aztec, educators and curators trained 500 people as interpreters who would work within the exhibition; they included dancers, storytellers, artists, and volunteers who answered questions, provided information, or were stationed behind touch carts holding such objects as jaguar pelts, baby cradles, and other ethnographic materials. Thus began a continuing tradition of enhancing temporary exhibitions with interactive educational programming to meet the needs of diverse audiences.

In 1999 Museum educators began to create a string of temporary discovery centers, generally themed to coincide with a current exhibition. Over the next five years, there would be 10 of these, all extremely popular with visitors, particularly the families for whom they were intended. One example was the Viking Village added to enhance the 2001 traveling exhibition Vikings: The North Atlantic Saga. Visitors to the village were greeted by costumed enactors Helga and Harald. They could wander along a village street busy with merchants, farmers, artisans, and sailors, and explore a longhouse and a Viking ship. Activities included jewelry making, spinning and weaving, fabricating a wattle-and-daub fence (Fig. 3.13), and cooking up a Viking stew. Between 5 and 15 volunteers were present in the village at any one time, trained by curators in subject matter and by educators in facilitation techniques. On average more than 2,000 adults and children visited the Viking Village each day. Evaluations revealed that children who visited the village remembered more about the exhibition, parents and other adults became more involved with children, visits to the exhibition lasted longer, and families repeated their visit.

Encouraged by the success of this and other temporary discovery centers, the Museum added a permanent Discovery Zone in 2002, focused on areas of Museum expertise and changed periodically to enhance temporary exhibitions. In this space families can dig for fossils (Fig. 3.14), dissect an owl pellet, build a tower, or participate in shows such as African Rhythms. The Discovery Zone has proved so popular (per square foot it sees more visitors than any other spot in the Museum) that in 2014 the Museum will enlarge and upgrade it with a new 5,400-square-foot Discovery Zone on the second floor of the Science Engagement Center, tailored especially to the interests and abilities of early learners.
Vikings offers a good example of another Museum-created enhancement. For this exhibition, and for other exhibitions and occasions, the Visitor Programs staff produced a festival, in this case over a weekend. Activities began Friday night with a feast of Viking fare. Over the next two days, Vikings filled the Museum (staff, volunteers, individuals from Denver’s Nordic communities, and members of the Society for Creative Anachronism role-played for the occasion). In costume they paraded throughout the Museum, fought battles in the atria, demonstrated crafts, played music, and told stories. Although the exhibition itself was ticketed, the festival was free to all Museum-goers. This tradition of special events continues with annual Fiesta Free Days, Space Days, Astronomy Days, and Earth Days. Events such as Ice Age Festival or Pirate Invasion celebrate Museum research or temporary exhibitions.

Costumed characters, including authentic historical enactors, often enliven temporary exhibitions. The first was the ship’s barber-surgeon in the 1987 exhibition *In Search of the Mary Rose*. Today enactors are regular inhabitants encountered anywhere in the Museum. One is Mr. Bones, a dinosaur puppeteer who roams the halls during the Museum’s 12 yearly free days (Fig. 3.15). Another is Miss Margaret Winters, who entertains visitors with tales of life as a naturalist in 1908 Colorado (Fig. 3.16).

Surveys conducted while planning the *Space Odyssey* exhibition, which would open in 2003, revealed that visitors most wanted “to experience space.” Exhibit planners tried to make that happen, and they also included opportunities for the personal discoveries that might occur through interaction with an object or device or through a conversation with a knowledgeable person. Accordingly, the exhibition offered visitors the opportunity to watch the play *Living in Space*, talk to an astronaut as he or she maneuvered about the Mars landscape, dock a space shuttle, help make a discovery (Fig. 3.17), or strike up a conversation with a Museum Galaxy Guide, a volunteer trained in space science, some of whom carried a laptop computer to help answer complicated questions on the spot or send an e-mailed response, extending the Museum experience right into the visitor’s home.

During planning for *Expedition Health*, which would replace the popular but aging Hall of Life exhibition in 2009 with an even greater focus on the visitor, exhibit educator Nancy Walsh (now director of Museum Programs) commented that this was not an exhibition about the human body, it was about your human body. *Expedition Health* includes a laboratory where visitors can perform experiments (Fig. 3.18), a suite of educational carts, and highly interactive shows such as Pirates of the Human Being: Meet Your Microbial Mates and The Superfood Heroes.
CHAPTER 3 — EDUCATION Informal Science Learning for the Public

The Denver Museum, along with many others, recognized that its visitors were not ethnically diverse and has tried to make visitation more reflective of the Denver community. In the 1990s the Museum initiated efforts toward greater inclusiveness with such new programs as a multicultural camp-in, African American cultural activities, a minority intern program, a community outreach coordinator, and cultural diversity training for staff, adding these to continuing programs such as the Native American Resource Group. Not all of these programs continue; others have taken their place to fulfill similar goals. But despite these efforts, today Museum visitors, staff, and volunteers still do not represent the diversity of ethnicity and class in the metro Denver area.

A fast-growing segment of the Museum’s audience has been families with preschool-age children. Portions of the discovery areas had been created with this group in mind. In 2004 an ambitious and unusual collaboration greatly increased cultural opportunities for this audience. Initiated by the Mayor’s Office for Education and Children, The 5 By 5 Project provides low-income Denver Head Start and Early Head Start children and their families with year-round access and educational opportunities at 13 of Denver’s cultural venues, including the Denver Museum of Nature & Science, at no cost. The project’s goals are to strengthen families and support school readiness by providing Denver’s young children with at least five cultural experiences by the age of five. To participants of the program, the Museum provides free unlimited family visits, a bilingual guide to children’s activities in the Museum, science tattoos, and free Planetarium shows. Teachers report that the project is improving students’ vocabulary and verbal skills, building confidence, and enhancing classroom participation. Parents report that these opportunities, which they could not otherwise afford, have strengthened their families and have increased their sense of belonging to, and ownership of, the community.29 The program illustrates the empowering and far-reaching capacity of a Museum experience.

It is nearly impossible to visit the Museum today without experiencing opportunities to interact with staff or volunteers or Museum objects in fun, enlightening ways. In 2010 the 25 members of the Visitor Programs staff performed more than 7,000 shows and interacted with visitors 1.9 million times. The Museum is known nationally for programming of this type.

Adult Programs

Beginning with the Film Lecture Series in 1940, the Museum has always offered after-hours programs for adults: lectures, courses, behind-the-scenes tours, field trips, and international and regional travel, most coordinated early on by the Public Programs Department and later by the Adult Programs Department.
At times the Museum has hosted celebrity speakers with large reputations. Jane Goodall has made several appearances, as have paleoanthropologists Mary and Richard Leakey. But expensive, world-famous speakers have not been required for successful programs. Rather than focus predominately on the “who” of the talk, Museum planners have more recently focused on the “what” and the “how.” They choose speakers whose topics are relevant to audience interests, the Museum’s core competencies, and current science or cultural topics. Equally important is the selection of speakers who can inspire a lay, but sophisticated, audience. Adult Programs staff offer advice and guidelines tailored to the Museum’s audience and insist that lecturers be prepared for a lively, sometimes challenging question and answer session following the talk, for, as with adult audiences everywhere, the Museum’s audiences want participation. Speakers from inside the Museum, its curators and other scientific staff, are held to the same high standards of effective communication. The Museum is unique and fortunate that its scientific staff has always been interested in communicating science to the public and has appreciated the guidance of knowledgeable program organizers.

In addition to the public lectures held in the evenings, Museum scientists offer less formal free lunchtime lectures that showcase current research to an audience composed primarily of volunteers and staff. In this way, information and expertise are shared among the Museum community.

Adult programs often complement and amplify an exhibition. During Aztec, for example, the Museum offered a four-part series titled The World of Moctezuma and five lectures on the Aztec world. Stephen Jay Gould helped celebrate the opening of Prehistoric Journey, and Sir Edmund Hillary spoke
Lecture topics are often designed to coincide with current events: in 1997 Alan Hale timed three sold-out lectures with the rare appearance of Hale-Bopp, the comet he codiscovered. Following the tragedy of September 11, 2001, the Museum offered a controversial but important series titled Understanding the Middle East. And when the rovers landed on Mars, the Museum was there: in 2004 the Museum threw open its doors, quite late at night, so the public could watch the landings via a live feed from NASA, narrated by the Museum’s curator of planetary science, Steve Lee.

Programs often bring the Denver community together in discussions of current issues. When Denver Mayor John Hickenlooper launched his Sustainable Development Initiative in 2005, the Museum collaborated with five lectures on water issues. Panels representing divergent viewpoints have debated Living with Wolves, Bears and Humans, and The Future of Our National Forests. In 2010 Our Energy Future included perspectives from government, the oil and gas industry, environmentalists, scientists, and the audience. Using handheld wireless devices, the audience could enter the discussion in real time, clicking to indicate their opinions. “This topic is challenging, and you turned it into a fun, motivating evening,” commented one participant.

Museum members and others who want deeper exposure to a topic can enroll in one of the Museum’s courses; approximately 35 are offered each year. The courses range in intensity from Osteology, a semester-long study of vertebrate bones that includes tests, grades, and an option for college credit, to a three-hour discussion about the Anthropology Department’s bead collection. Most of the courses use specimens from the collection, and many involve field trips to directly experience what was studied in the classroom. For example, arachnology students conclude their coursework with a search for spiders in the field; geology students apply their knowledge of stratigraphy to highway road cuts. The most intensive course is the Paleontology Certification program. This series of eight classes attracts citizen-scientists who want to learn more about fossils and how to collect, prepare, and care for them. Begun in 1990, the program is managed by Adult Programs and taught by Earth Sciences Department staff. It has been used as a model for other institutions and organizations and has drawn students from around the country. As of 2010, 275 students have received their certification. Most during the 1997–1998 run of the IMAX film Everest (Fig. 3.19).
have gone on to work with Museum scientists in the lab or the field. One has written a book, several have published or presented papers, and two have discovered new dinosaur species.

Liz Davis, the current manager of Adult Programs, agrees with former curator Hartmann: the availability of space is key to abundant and successful programs. The Museum is fortunate to have a variety of venues for adult programming: classrooms, the intimate Ricketson Auditorium, the much larger Phipps IMAX Theater, and all the secret spots behind the scenes. Science studios will be available with the completion of the Science Engagement Center in 2014. Through the technological savvy and wizardry of Space Science Curator Ka Chun Yu, Planetarium programs provide visualizations and immersive experiences in geology or history as well as astronomy, and can combine these with art and music—a dramatic realization of Director Bailey’s long-ago dream (Fig. 3.20).

Davis and others before her have studied the demographics of the attendees of the Museum’s adult programs and found that on average they are 55 or older, have advanced degrees, and mid- to high socioeconomic status. They are appreciative, loyal, and lively, but they are not especially diverse. Over the years, program planners have worked in various ways to attract new and different audiences. The Museum has a longtime relationship with the Anschutz Family Foundation, which has helped the Museum with programming for seniors, especially those who might not otherwise come to the Museum. On occasion programs were offered off-site, for example 6 Billion People Day, an open-mike forum held in downtown Denver.
Formats were experimental: in collaboration with Colorado Humanities, Chautauqua-type performances introduced audiences to Thomas Jefferson, Galileo, Sir Isaac Newton, Meriwether Lewis, Ben Franklin, and Robert Oppenheimer. Relationships with organizations having similar missions, such as The Nature Conservancy, or with expertise in an area attractive to our audience, for example the Denver Film Society, have helped grow the Museum’s adult programming and its audiences.

The most successful recent effort has been the monthly Science Lounge, targeted at an audience 25 to 45 years old (Fig. 3.21). Promoted as “Entertainment, Mind-Expanding Science, Cocktails,” the evenings are interactive and social. This promotional description for the January 2011 program gives the flavor:

**Ice Age on the Rocks**

Ice Age myths exposed! Find out if you could have survived the icy tundra by throwing an atlatl at a mammoth target. Enjoy drinks, music, and scientists on ice. Learn the latest about the Snowmass Village discovery from two of the scientists who led the dig.

More than 300 people attended this event, 75 percent between the ages of 25 and 45. Overall, they felt this was a “mammoth” evening. Many staff enjoy the event as much as the participants; it is an exciting and creative collaboration among Adult Programs, Visitor Programs, and Research and Collections, and it involves others across the Museum as well. With the help of recent and longtime partnerships, and especially with the Science Lounge, the Museum is successfully broadening its future adult audience. With new audiences and new formats, Adult Programs is growing, in 2010 reaching 13,000 participants.

**Youth and Teacher Programs**

With few exceptions, such as the travel programs mentioned previously, all of the Museum’s education programs have grown over the last 20 years. Nowhere is this more obvious than with the youth and teacher programs. As noted earlier, in 1985 only two staff members were identified as educators; they conducted school tours and trained volunteers. Today, 25 years later, the Youth and Teacher Programs Department includes 35 full- and part-time staff, around 20 seasonal employees, and nearly 80 adult and teen volunteers. These educators reach approximately 300,000 schoolchildren and teachers annually through a wide array of programs.

One of Goddard’s early actions as director was to take classes off-site in a program called Worlds of Wonder (or WOW), which traveled in a van funded by SCFD (Fig. 3.22). The 2010–2011 catalog of offsite programs to
schools lists 37 different offerings, including classroom programs, assemblies, displays, after-school activities, and distance learning. Museum educators also visit libraries, community organizations, fairs, and festivals.

Onsite programs include facilitated tours, self-guided tours, labs, classes, children’s summer and weekend workshops, camp-ins (Fig. 3.23), homeschool days, and IMAX and Planetarium shows for school groups. The Museum’s various opportunities for professional development served more than 3,000 teachers in 2010 (Fig. 3.24).

Museum education programs are above all Museum programs, making use of all the institution has to offer. They center on at least one of the Museum’s core scientific competencies: geology, paleontology, health science, space science, zoology, and anthropology. Often they feature the specific research projects of individual scientists. They are object based, making full use of the 37,000-object education collection. They are informal, experiential, and sometimes messy: in the lab programs, for example, students participate in dissections of frogs or sheep lungs. Museum dioramas and exhibits are available to them: in Colorado Wildlife Adventures, children can investigate predator-prey relationships by examining skulls and pelts and by encountering the animals in the dioramas of the Explore Colorado hall. Often programs complement a Museum temporary exhibition, as they did with Aztec: classroom programs included A Day in the Life of an Aztec Child, Health in the Time of the Aztecs, and Plants, Animals, and Aztecs. A resource book on the exhibition and a discovery kit of slides and audiotapes prepared teachers and students for their Museum visits.

The Museum’s children’s programs are also relevant to the needs of the schools and the school audience. All programs are age-appropriate and
support Colorado Model Content Standards for education. The audience is primarily preschoolers to eighth graders from the seven-county Denver metro area. One program, WEBS (named for its focus on ecology, the web of life), is a partnership with DPS and its Balarat Outdoor Education Center. Volunteers began this program in 1976 and still conduct it, the only current Youth and Teacher Programs offering not taught by paid staff. Each Monday a WEBS volunteer and a Balarat teacher hike with the kids at Genesee Park, interpreting what they see. Then they come to the Museum, where hands-on specimens and dioramas add depth to the morning’s experience. In 2010 about 15 WEBS volunteers reached 1,283 students, nearly 20 percent of DPS third graders.

Reaching and serving low-income children is an important Museum goal that is also relevant to the needs of the larger educational community. Scholarships for classroom programs and workshops are available for classes or families with demonstrated need. A Bus Fuel Fund enables field trips for economically disadvantaged Colorado schools. During the 2011–2012 school year, a time when schools faced serious financial difficulties, the Museum offered free Museum admission to school groups and other organized youth groups on self-guided tours. Some of the Museum’s most creative and ambitious programs are intended for underserved audiences. The Student Health: Awareness and Responsibility through Education (SHARE) program of 1996, conducted in Spanish and English, taught the role of personal responsibility for good health decisions to third- to fifth-grade students. The Class of 2003 was a collaborative program between the “I Have A Dream” Foundation and the Museum and was funded by the Texaco Foundation. As part of the program, in 1994 61 fourth graders from Stedman Elementary were adopted for nine years, until they graduated from high school. During that time they and their families were provided with Museum educational experiences, including two and a half days at the Comanche National Grasslands in southeastern Colorado, where the children studied birds of prey and small mammals in a “research in action” experience.
Distance Learning

In 1990 Diana Lee Crew, manager of the Museum’s travel program, acquired a very different kind of project: the Jason Project, which was the first step in the evolution of the Museum’s distance learning programs. Jason, an innovative national program founded a year earlier by oceanographer and explorer Robert Ballard, was designed to excite students about science by connecting them in real or near-real time with real scientists involved in actual projects. Using emerging technology, Jason featured a live feed from scientists at their research sites to students, some in satellite sites around Colorado, most in Ricketson Auditorium at the Museum. Students, who prepared in advance for the experience, were able to question the scientists directly. In 1992 the Museum’s involvement became even more firsthand when it sent two student argonauts and one teacher argonaut to the Sea of Cortez, where they helped scientists study tubeworms and other strange marine animals and helped research migrating gray whales. In later years the Museum sent argonauts to Yellowstone National Park and to Hawaii. Jason continued at the Museum until 2003.

The Museum’s next venture into distance learning was the 2006 R@D:IUS project (an acronym for Research at DMNS: Investigating and Understanding Science). In collaboration with Rocky Mountain PBS, paleobotanist Kirk Johnson and space scientist Steve Lee broadcast live into schools using videoconferencing equipment. In 2007 R@D:IUS evolved into the more accessible and ambitious Scientists in Action program. Once a month this free program connects students in grades four through eight directly with scientists during live 45-minute broadcasts from field sites or research labs. During the conversations, scientists demonstrate research techniques or share discoveries while students virtually look over their shoulders, an experience the Museum designed to promote critical thinking and communication skills and to foster scientific literacy. During the 2010–2011 school year, Museum astronomers, anthropologists, biologists, health scientists, and geologists beamed themselves into classrooms (Fig. 3.25).

A basement room is the unpretentious site of Virtual Classes, the Museum’s newest distance learning program. As an educator dissects a sheep heart or lung, students in classrooms, perhaps in New York or Pennsylvania, observe via videoconference the workings of the circulatory or respiratory system and can discuss them with Museum staff. Beginning with health science in January 2011, the program will expand to other disciplines in the future. In 2010 Virtual Classes and Scientists in Action reached 6,932 students.

Through the Museum’s website, teachers can access online guides to the Museum’s major exhibitions; these provide relevant content, student activities, online resources, and other background information to help with self-guided visits to the Museum. Two teacher professional development courses are available online. Titled Making Science Relevant, one course covers life science and is offered in collaboration with the Denver Zoo. The second course covers earth science.
Three recent programs are intended for children in low-income neighborhoods. Passport to Health extends the experience of the Museum’s Expedition Health exhibition to fifth graders at 30 low-income schools in the Denver metro area. Funded by the Colorado Health Foundation, it is free to the schools and is intended to increase students’ understanding of health science, raise their health literacy, and inspire them to lead healthy lifestyles. The Early Excellence Program provides monthly bilingual parent-child workshops in science to families with young children who attend Harrington Elementary or Academia Ana Marie Sandoval, both in lower-income Denver neighborhoods. The third program, Urban Advantage Metro Denver (UA Metro Denver), is likewise intended for underserved children, their families, and teachers, but this time the students are seventh graders. UA Metro Denver is a partnership between metro-area school districts and science-based cultural institutions (the Denver Museum of Nature & Science, Denver Zoo, and Denver Botanic Gardens). As the lead organization, in 2010 the Museum received $3.27 million from the National Science Foundation, the largest federal grant received by the Museum. The program is designed to improve science literacy and promote science inquiry and investigation among middle school students. Like Passport to Health, UA Metro Denver provides professional development, field trips, family days at the Museum, family nights at the schools, and resource materials. Scientists at all three institutions help students with their projects and investigations. Both the Colorado Health Foundation and the National Science Foundation have included funding to evaluate the outcomes of both programs—including, in the case of Passport to Health, efforts to better understand the role of adult influencers and family members in informal learning.

Youth and Teacher Programs has developed these recent programs specifically in response to research findings that show the importance of science education for two age groups: preschool and early childhood, when the excitement for science can lead to success in school and a lifelong interest, and grades four to eight, especially girls, who are likely to lose their interest and ability in science if they have not acquired it by then (Fouad 2008). These programs also intend to answer society’s need for greater science literacy, locally exemplified by the Denver paradox. This is the incongruous situation in which Denver is rich in science- and technology-related employment opportunities, yet its schools perform poorly in science literacy and thus do not prepare students for these opportunities. The Museum’s 20/20 strategic plan, established in 2005, responded to these needs and opportunities by chartering the Youth and Teacher Initiative. This initiative, led by Andrews, has as its goal nothing less than transforming the Museum’s science education for preschool through eighth-grade children. The Science Engagement Center, to be built on the south side of the Museum and scheduled for completion in 2014, will house the program. The center will include
galleries for temporary science-based exhibitions targeted to younger audiences, state-of-the-art science studios, and an entire floor devoted to early childhood education, with a discovery gallery especially for this age group (Fig. 3.26).

The programmatic transformation begins with the Science Education Framework developed by Karen Hays, manager of school programs, and her team. This document identifies science processes, age-appropriate science content, unifying scientific themes, and criteria for exemplary science program delivery. In spring 2011 the framework was used to audit all current Youth and Teacher Program programs. Andrews anticipates that as a result of this audit, 12 to 15 programs will be eliminated, the rest will be revised, and new programs will be added; all will advance science literacy. As Andrews says of this process, “We are reinventing ourselves.”

Over the last 100 years, Museum education has come a long way from its early days of lectures and lending kits. Today, education staff in all departments are venturing off the traditional path, well-constructed by early years of successful programming, and they are heading off in new directions. If they could glance over their shoulders, they would see Education’s early supporters and builders—Figgins, Niedrach, Bailey, Hartmann, and Goddard, among others—who would be pleased to see that their Museum had indeed become “a centralized place of learning.”
CHAPTER 3 — EDUCATION Informal Science Learning for the Public

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