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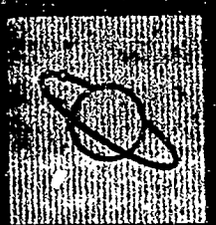
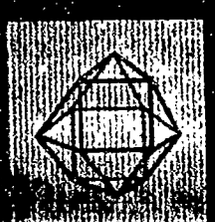
ABSTRACT

This booklet is one of four volumes developed to make science more accessible to students with disabilities. It discusses issues in program accessibility for program directors, parents, and teachers are: (1) finding out that out-of-school science programs require a great deal of effort; and (2) having to investigate the accessibility of the site of the program so that both site and content are accessible to the young people who want the experience. A section on Resources concludes the booklet. (ZWH)





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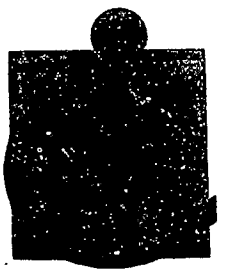

ACCESS TO SCIENCE LITERACY

AMERICAN ASSOCIATION FOR THE
ADVANCEMENT OF SCIENCE
1333 H Street, N.W.
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202-326-6630 V/TDD

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INTRODUCTION

Barrier-Free in Brief: Access to Science Literacy is designed for two audiences. The first audience includes Principal Investigators and Program Directors of out-of-school science programs; leaders of science/math activities for youth in community-based organizations; planners and teachers of student and family classes in science and technology centers, museums, zoos, and nature centers; and developers of curricula, workbooks, and kits that introduce young people to the excitement of science.

The second audience includes young people with disabilities, from preschool through high school and beyond; their families, teachers, and counselors; leaders of disability-based family and youth groups; and supervisors and teachers of students with disabilities, both mainstreamed and in self-contained classes.

Members of the first audience need practical information to make their programs and materials accessible to all students, including those with disabilities, so that all young people can acquire the desired level of science literacy — for further education, for employment opportunities, and, if desired, for pursuing a career in science, math, or engineering.

Members of the second audience — young people with disabilities, their families, teachers, and counselors — need these opportunities for informal, hands-on science experience, and want practical advice on where to find programs. They also need to know how to work with program directors to make accommodations for specific disabilities without diluting important content.

This publication addresses both audiences, *in brief*, and directs readers to other useful resources. It is a companion volume to three other AAAS *Barrier-Free in Brief* booklets, each of which could serve as a starting point to gather additional information to make informal science activities accessible to students with disabilities. *Barrier-Free in Brief: Access in Word and Deed* gives program planners the most appropriate language for encompassing students with disabilities in announcements and applications. *Access in Word and Deed* also lists the names, addresses, and phone numbers of 80 experts in science, technology and disability, most disabled themselves, who can serve

as consultants, speakers, or role models; these individuals can recommend other human resources to contribute to a program or publication. *Barrier-Free in Brief: Laboratories and Classrooms in Science and Engineering* presents specifications for labs and classrooms that are accessible to all, with examples of assistive technology and low-cost accommodations. *Barrier-Free in Brief: Workshops and Conferences for Scientists and Engineers* shows how to plan and conduct a meeting — large or small, on campus or in the city — so that persons with disabilities can be full participants. Organizing a barrier-free meeting is an important component in evaluating programs and planning for the future; it allows for persons with disabilities to contribute on an equal basis.

We hope you will find all four booklets useful. However, in your planning, always remember to talk directly with the persons with disabilities whenever possible. A team approach results in the most effective access.

I. WHAT IS INFORMAL SCIENCE?

...A fossil-collectors club at the science museum
...An afternoon science television program
...An adult-child workshop in telescope construction and an evening of star-gazing with the local group of amateur astronomers
...A Saturday of bird-watching
...A summer camp on a college campus, exploring robotics and automation and other components of engineering technology.

All of these are real examples of how people are engaged with science outside of school. Many people who have become scientists and engineers relate stories of non-school activities which stimulated and kept alive their interest in careers in science and engineering. This kind of experience will open the way to lifelong involvement and literacy in science for today's youth.

Informal science embraces a great range of activities — Science Fair projects and after school computer clubs at school, moving out from the school building to weekend classes at museums, behind-the-scenes tours of the aquarium, and Scout camp-ins. For older students, there are projects to clean up trails at state parks, mentor and shadow programs, and research opportunities.

Young people with disabilities can participate in all these activities. Depending on the individual person, each activity will require a little more advance planning. Some projects may require special accommodation. Other programs will require nothing special at all, except the recognition by everyone concerned that accessibility problems can be solved.

Informal science experiences do not always take place in groups. Children and teens sometimes spend a lot of time at home, and young people with disabilities may, for a variety of reasons, also be at home for long periods. Curiosity and learning can be encouraged by reading or looking at science books and magazines and television programs designed for young people of different ages. Science books on tape cassettes give access to students who are print-impaired. Networking over computer bulletin boards is a wonderful activity for a student who has access to a computer at home.

Many computer stores have scientific games that enrich a young person's learning experience. Kits in every area of science and technology can be found in National Park gift shops, neighborhood novelty stores, toy catalogues, and newspaper advertisements. If a young person has manual dexterity limitations, a kit can be a family activity. The young person can give instructions on how to put the kit together. Thinking out how to solve a problem can be just as important as doing it.

III. ISSUES IN PROGRAM ACCESSIBILITY: FOR PROGRAM DIRECTORS

For many reasons, even the most well-established and extensive out-of-school science programs are unknown or overlooked by some people. In the past, many programs have been inaccessible to students with disabilities, so that these students and their parents become frustrated and do not actively seek out activities or notice announcements. Many young people who are interested in the field do not know that out-of-school science programs exist.

Program directors need to make an extra effort to explain programs and recruit students with disabilities. Directors should not assume that students with disabilities know about programs just because standard publicity has been sent out. A student with a disability may not know about a program simply because an announcement was placed on a bulletin board that is too high to read from a wheelchair or an announcement made over the loudspeaker was missed by a hearing impaired student.

In addition to lack of information, more subtle barriers such as attitudes can discourage a student with a disability from inquiring about a specific opportunity. Parents can be reluctant about letting their child participate independently in an unfamiliar setting. Teachers of disabled students can also be overprotective and shelter students from new activities.

You need to make an extra effort to explain programs and recruit students who have disabilities. Special publicity about accessibility lets students with disabilities know that a program is available to them.

A few additions to publicity materials will carry the message that participants with disabilities are welcome and that support systems are available.

- In your program announcements, include illustrations or photos of people with disabilities doing science. If your program has no history or photo archive of participants with disabilities, you may need to do some research to obtain an appropriate illustration (See *Barrier-Free: Access in Word and Deed* in **RESOURCES** section.).
- Acquire a TDD, a telecommunication device for the deaf (under $200), and list the program phone number as "Voice/TDD." TDD

access is the most effective way to indicate to deaf youth and their parents that they are welcome.

- Inquire about the local public service radio station directed towards blind consumers and request an announcement of your program.
- Seek out special educators and consumers in your community who use computer bulletin boards directed towards special education (e.g., SpecialNet) and disability-specific groups, and invite applicants to your program via the bulletin board.

Recruiting

In most public school systems, students with disabilities are not all enrolled in one building or neighborhood. This means that recruitment often must be more individualized than it is for minority students, for example, who may be concentrated in particular schools. Also, schools have confidentiality restrictions and cannot distribute names and addresses of any students, including those with disabilities. However, other recruitment techniques can work well.

- Identify a science or classroom teacher or science supervisor who will cooperate by talking with individual students with disabilities and their families and describing your program. The parents then will contact you directly.
- Tap into parent networks through local disability organizations, neighborhood associations, and churches. Ask them to list your program recruitment effort in their newsletters or to announce them at their meetings. Enlist one active parent who knows the out-of school grapevines and can serve as a link between you and other parents.

Content

When planning an out-of-school science program, consider the following:

- What is the student expected to learn in the experience?
- If the student with a disability cannot participate in the same manner as other students, how can the same material be learned?
- Can the learning be accomplished with the assistance of a simple technological device or a partner?
- **How can the student be involved in planning and implementing the adaptation?**

Access to Programs and Places

The adaptations needed to make programs and curriculum materials accessible to students with disabilities do not have to be costly or involve extensive

reorganization. Students with disabilities do not have to be with a group made up exclusively of other disabled students. When disabled and non-disabled students work together, they help each other and **learn together**. It is important to move away from "disabled only" and instead make every program accessible to both disabled and non-disabled students. This diversity will strengthen all students' learning by having them notice how different people approach different situations.

It may be difficult for a young person with a disability to tell you about his or her limitations. The student may not realize what accommodations are available and feel embarrassed about needing or requesting adaptation. Alternatively, if the student does not know what the experience will entail, it may be difficult for him or her to articulate what may be needed to ensure access to the learning. On the other hand, some young people are very experienced with assistive technology and may be the most competent consultant for their own technology needs.

Program directors and faculty must not make preliminary assumptions about students with disabilities and should consult privately with a student who may need some program accommodations. Not all students with disabilities need adaptations. For those who do, the adaptations will vary from person to person. Technology advances constantly and any resource list becomes incomplete in a short time. The resource list in the last section is a start. (See page 22.)

Young people with disabilities can participate in all out-of-school activities. When planning a program at your own site, take another look to make sure that the student has complete physical access to the facility. When going to another location, try to visit that site well in advance to check out accessibility. If a prior visit is impossible, call ahead to discuss access issues. Do not ask a general question, such as, "Have you ever had visitors with disabilities?". Be specific about what accommodations are necessary for the student to fully participate. For example:

- If the program is located in a greenhouse, is the entrance ramped or at ground level for a wheelchair user?
- If not, can a simple wooden plank be provided by the greenhouse to make a ramp?
- Is there an accessible bathroom?
- Can people bring tape recorders for note taking?
- Can provisions be made for an interpreter for students who are hearing-impaired or deaf?
- Can written materials be made available in alternate formats, i.e., on tape or disk for students who are visually-impaired?

A program in a greenhouse presents one set of problems. On a field trip to a larger installation, there are other considerations in addition to those above:

- How will students travel to the site? Is the school bus, van or public transportation accessible to mobility-impaired students? If not, can you arrange for accessible transport?
- If a group is visiting a site with a formal tour, such as a space center, how is the tour conducted?
- If the facility provides its own transportation on the tour site, are there lift-equipped vehicles available for people who use wheelchairs?
- If there is a recorded explanation, for example, as the bus drives to the launch pad, what modification can be made for a deaf or hearing-impaired student? Is a script of the recorded remarks available in print?
- Is the tour arranged so that a hearing-impaired student who lipreads can be guaranteed a position in front of the speaker in an auditorium? (This works only if the lights are on — not in a darkened room.)
- Are slide shows, films, or videos captioned?
- Could a blind or visually-impaired person have a partner to describe the visual components of the tour?

In many instances, accommodation can easily be made if the specific needs are described in advance. For example: Club meetings can be changed to another site to accommodate a member who has a disability. If a science center does not have an elevator to upper floors, a lecture can be held in a first floor classroom. Curriculum materials can be recorded on tape for people who are blind or visually-impaired.

ACCOMMODATING

The two most important things in adapting a situation to fit the needs of students with disabilities are:

- Never assume what accommodations are necessary;
- Consult the student first and discuss what approach to take.

Here are more suggestions for making informal science programs accessible to students with specific disabilities:

For Students Who Are Blind or Visually Impaired

- Before a program, allow time for the student to become oriented to the room or open space and to the locations of materials, furniture, and equipment.

- Use tactile models or expanded auditory descriptions to enhance the description of experiments and projects.
- Prepare print materials in alternate formats, i.e., braille, disk or tape, or large print (depending on the specific needs of the student).
- Encourage students to use tape recorders or braillers to record notes and observations.
- Assist students in determining if relevant magazines and books are available in large print editions at a local library or on cassette from the Library of Congress or Recording for the Blind (RFB). (See **RESOURCES** section.)
- Assign partners to assist students by explaining visual aspects of projects or experiments and to provide orientation to new environments.
- Inquire about computers with output in braille or synthesized speech, and videotapes with Descriptive Video Service (DVS) - a new technology that offers visually-impaired viewers an auditory description of portions of a film. (See **RESOURCES** section.)

There are a variety of devices which can be useful to blind and visually-impaired persons in performing scientific activities. Some of these are talking calculators and thermometers, light probes, audio warning signals, talking clocks, magnifiers with different strengths, tactile models for use in biology and geology, and raised-line drawings that can illustrate material shown on a chalkboard or overhead projector. Raised bumps can be added to rulers and other measuring devices so the students can feel the measurements.

For Students Who Are Deaf or Hearing-Impaired

- Print materials are extremely helpful to deaf and hearing-impaired students, i.e.,
  - written instructions about club projects
  - schedules of activities — for the afternoon, day or year
  - lists of new vocabulary, especially scientific and technical terms used in the activities
  - names of leaders — not only the program director but also teachers, teaching assistants, aides, bus chaperones, or volunteers
  - illustrations or diagrams that describe an experiment.

If the program includes **talks** or **formal lectures**, most students who are deaf or hard-of-hearing students need close-up seating and an interpreter (sign language or oral) and a volunteer notetaker. Some students have residual hearing and may ask the lecturer or leader to clip on a microphone allowing them to receive information via an assistive listening device. Large group

discussions are difficult for almost all hearing-impaired persons because they don't know who is speaking. If every speaker raises his or her hand before speaking, it is helpful. Projects with one or two partners are usually a much better communication situation, provided the partners show some patience.

Computers offer an essentially barrier-free tool to students who are deaf or hearing-impaired.

If deaf or hearing-impaired students are in the group, the program directors should make **every effort to show only films or videos that are captioned.** Otherwise, the students can absorb almost nothing from the films. An increasing number of educational videos are available in closed-captioned versions as are many general entertainment videos. If a film is not available captioned, it can be reviewed in advance and a print synopsis given to the student. However, this is a less desirable alternative. (See **RESOURCES** section for information on captioning.)

Real-time captioning of lectures is the ideal support service for advanced students who are deaf. This is a new technology now used in some universities that could be very useful to deaf members of the audience in museum lectures.

For Students Who Are Mobility Impaired

- Entryways into buildings and rooms must be at ground level or have ramps. (Temporary ramps can be constructed from wooden planks, but be sure that the wheelchair user feels comfortable and safe on a temporary ramp).
- Accessible bathrooms must be available.
- Program books and materials must be within reach. The students should be able to access any equipment they need for the program.
- Laboratories should be arranged so that people using wheelchairs, crutches or canes can easily move around the tables.
- Large, easily-managed materials can sometimes be substituted for smaller ones. This can simplify usage for people lacking manual dexterity or fine motor coordination movements.
- Lift-equipped vans may be needed for people who use powered wheelchairs to participate in field trips. Station wagons or large cars may also be used for people who use manual chairs and can transfer out of a wheelchair onto a car seat with minimal assistance. The wheelchair can be folded and put in the back seat.
- Some students who have coordination limitations may need a partner to help them manipulate materials or assist them in walking on rocky terrain or beaches during field trips.

- Students who have coordination limitations may also need a computer with a specially adapted keyboard or other features.(See Resources section.)

For Students Who Have Speech Impairments

- Some students with speech impairments may be difficult to understand. Ask them to repeat rather than make guesses about what they said.
- Allow students whose speech is difficult to understand to pass notes to someone who will articulate for them.
- A severe speech impairment can hide an intellectually active problem solver. Recent developments in computers and communication technology for non-speakers open the way for education and careers in science and technology. (See ***Communication Outlook*** in **RESOURCES** section.)

For Students Who Have Learning Disabilities

Informal science programs are particularly significant for students with learning disabilities. The hands-on activities and the many possibilities of multiple-sensory experiences provide a learning environment that is ideal for many students, without reliance on the written word.

Other students benefit from the organizational learning, in a setting quite different from a traditional classroom. The team approach to problem solving often lets students who have been discouraged by drills and tests to demonstrate their strengths and creativity.

For all learners, more time with ideas and materials is useful, and especially for those with learning disabilities.

III. ISSUES IN PROGRAM ACCESSIBILITY: FOR PARENTS AND TEACHERS

FINDING OUT

Out-of-school science programs are not written up in the sports section of the daily newspapers.

TV programs about science are listed in the weekly TV guide, but they are rarely featured on the cover like a miniseries.

Science enrichment opportunities are occasionally mentioned on the radio, but hardly as frequently as automobile sales.

The point is that if you want to find out about out-of-school programs, you have to look harder, talk to more people, and make more phone calls than you would to find out the game scores, the prime-time programs, or the latest prices on cars. Then you have to investigate the accessibility of the site and the program and work cooperatively with the director so that both site and content are accessible to the young person or young people who want the experience.

School, library, and community center bulletin boards are sources of information on out-of-school science. Weekend or education supplements to newspapers are another source of information. When you go to teacher conferences, ask the teacher for suggestions or leads to additional resources. Ask at your church, synagogue or any place where you meet people who care about education and have high aspirations for young people. Talk to other parents at school-and-home meetings, or to parents in your building or neighborhood whose children are in college. If you have a relative or friend who works in a laboratory, or you know someone on the staff of a college or university, see if they can ask co-workers about organized programs and other opportunities. Call, write, or visit local universities, museums, zoos, nature and science centers, botanical gardens, and parks to pick up brochures and get your name on the mailing list of events and participatory programs.

SIGNING UP: WHAT'S AVAILABLE

Organized Science Programs

Check first at museums, nature centers, and zoos. Almost all of them offer a variety of programs on Saturdays and during the summer, for young people

of different age groups. Try to obtain announcements as early as possible when spaces are available. (This is often January, February, and March for summer programs, August for school-year Saturday programs.)

Many universities sponsor summer science programs for high school students. These types of programs may focus on a specific aspect of science — computers, math, biology or outdoor nature — or cover a range of topics.

Ask the science teacher or supervisor at school how to get information on summer programs that are funded by the National Science Foundation, National Aeronautics and Space Administration (NASA), U.S. Department of Energy, heart and cancer societies, and other national groups.

Volunteer Work

One way for students to get hands-on experience in a scientific field is to become involved in volunteer work. Some scientists with disabilities, who had to be hospitalized when they were young, became interested in their fields by volunteering in the hospital and asking questions about tests they were given or saw administered to others. By observing lab technicians at work, they became familiar with lab procedures. You may want to inquire about volunteer opportunities in hospitals, museums, schools and labs.

Part-Time Jobs

Often volunteer positions can lead to a part-time job. Even if your son or daughter does not find a job that directly involves science, any job can help develop skills and expose a student to new ideas and procedures. Students with disabilities often need opportunities to participate in real work experience. Worksite experience is as important as classroom experience for future career goals.

Mentor Programs

Another way for a student to pursue interests in science is to find a mentor - a person who can support and guide the student to a career in science. If a young person shows interest in a particular area of science, math, or engineering, a working adult in the same or a related field can be an invaluable resource on the topic. Students with disabilities might want to seek out an additional mentor from the AAAS *Resource Directory of Scientists and Engineers with Disabilities.* The Directory is a source of role models for disabled youth. It lists approximately 1,000 scientists, mathematicians and engineers with disabilities who can share their coping strategies in education and career advancement, and can encourage students with disabilities to receive proper

preparation to enter and succeed in technical fields. They can also direct students towards resources for financial aid, services for disabled students and innovative science programs. (See **RESOURCES** section.)

Internships

Internships require a serious time commitment - at least a month in the summer or several months of Saturdays during the year. Internships at science centers, environmental organizations, museums and zoos, usually volunteer, are offered to a student with a serious interest in a particular field of study. Students may have the opportunity to assist science center staff and scholars with research in a specific discipline, or they may expand their knowledge by doing a variety of tasks within the organization.

Some businesses and research laboratories may offer paid internships. Many of these programs are geared towards college students. However, a highly motivated high school student may be successful in obtaining a summer internship in an industry research lab. As business and the community become more accessible, such internships can be offered for students with disabilities.

Independent Research

Independent research in the school laboratory provides an opportunity for conducting experimental and hands-on activities centered on discovery in the laboratory or in the field.

This kind of activity requires real time commitment and support from a teacher and is appropriate for a student who has already participated successfully in group science activities. Some independent research might be conducted at home, in a back yard, or nature preserve. However, the student needs guidance from a teacher or mentor.

Outdoor Programs

Young people can learn environmental and ecological concepts through nature and camping programs. There are many organizations which have made their outdoor programs accessible to all students. Some emphasize development of social and survival skills in addition to academic ones.

- Girl Scouts and Boy Scouts focus on outdoor education and survival skills and have varied badge activities in different areas of science.
- Wilderness Inquiry, a Minneapolis, Minnesota-based program has adventure groups which include canoeing, biking and kayaking. They have developed adaptable equipment. The adventure groups are

composed of experienced and inexperienced people. (See **RESOURCES** section.)

- Voyageur Outward Bound is a wilderness survival program that accommodates people with disabilities. Four students with disabilities pair up with four people without disabilities for canoeing, rock climbing and spending overnights alone utilizing wilderness and survival skills learned from staff. (See **RESOURCES** section.)

Home Activities

If a young person with a disability needs to stay at home for any reason, there are still ways to participate in science activities. Hands-on experiments and model kits provide hours of independent activity for young people. You can find science kits in toy stores or museum gift shops. Make sure they are age-appropriate. There are also science materials available in computer software form.

Check with the reference librarian at your city or branch library to find books for young readers on different areas of science. *Science Books & Films* reviews new science books and videos at all age levels, as well as software and other learning materials that could be used at home or school. *AAAS Notes for Parents* offers practical suggestions for parents to encourage their children in mathematics and science. (See **RESOURCES** section.)

Getting There and Getting In

More and more public facilities and transportation systems are becoming accessible. These changes will open new doors to out-of-school science programs.

However, as parents and teachers of young people with disabilities, you know only too well that the world was not originally built to accommodate people with disabilities, and the world is not going to change in a day.

You may have more experience in building and program access than most directors of informal science programs. You can help by sharing this experience, including ideas about temporary but workable solutions to barriers.

In general, large facilities such as university campuses, libraries, science museums, and federal laboratories have accessible parking, entrances, and restrooms. Nevertheless, there may be buildings, parts of buildings or laboratories that do not have wheelchair access. You can work with the leader or director to see if a room location can be shifted or other solutions provided. Smaller settings such as neighborhood centers and churches, are less likely to be accessible. But the staff of these places may be willing to put in a great

deal of extra effort to include children with disabilities. Sit down and talk with them, and include the young people in the problem-solving discussion.

Outdoor sites require creative access strategies. One program in marine biology, where the students spent a lot of time on the beach, laid snow fencing over the sand so the students in wheelchairs could reach the edge of the bay. Again, involving many people in the strategy planning is the best route to full participation.

As communities develop more accessible transportation options, you may find alternative ways for the young person with a disability to reach a program site. A college that does not use all its accessible vans in the summer may be willing to lend or rent the van to a church-based science program for a field trip. An adult with a disability who owns a van might be hired as a driver and provide the van for an additional fee. Agreements can often be made with taxis for off-rush-hour transportation. Look around you and engage all the assets in your community. Contact Centers for Independent Living for additional ideas.

Making Needs Known

Even the most supportive program leaders or directors are not going to know about a child's special needs unless you inform them. Before the program starts, you must ask for a convenient time to talk to the director in person or by phone. If there are interns, counselors or teacher aides in the program, it would be best to include them too. You can write down a list of topics to bring to the discussion. It is not ideal simply to send a note, because it does not give the opportunity to ask or answer questions.

As children with disabilities grow up, they can take more responsibility in describing their own needs and accommodations. However, young people with disabilities vary tremendously in their comfort level in talking about themselves and their bodies: this is true of non-disabled youth as well. In most cases, it is probably easier for young people with disabilities to describe or demonstrate the assistive technology they use than to talk about their own function or lack of function. Besides, technology is usually of high interest to peers, and serves as an "ice-breaker" when non-disabled students are embarrased to ask questions.

If a student with a disability is attending a sleep-away science program outdoors or in a campus dormitory, accommodations have to be established before the student arrives. Although sophisticated "hi-tech" technology such as computers, caption decoders, sports wheelchairs, magnifying and reading machines are often featured on television and described in catalogues, low-

tech devices are not so well publicized. Families of people with disabilities are usually the experts on low-tech aids like wooden ramps, accessible closet rods, handheld magnifiers, adapted eating utensils, and signalling devices made of off-the-shelf components. Parents can share the low-tech techniques they have developed at home to make a sleeping and eating environment that works.

After It's Over

After it's over, don't let it be over. Parents and teachers can support a young person's science learning experience by helping him or her find reinforcing books in the library, programs on television, exhibits in the museum, software or kits as gifts. Even if you are not an expert in the science content, listen to the young person, show an interest and let him or her share that excitement of discovery.

IV. RESOURCES

To contact scientists and engineers with disabilities

Resource Directory of Scientists and Engineers with Disabilities (2nd Edition, 1987); available from

The American Association for the Advancement of Science
1333 H Street, N.W.
Washington, DC 20005
(202) 326-6630 (V/TDD)

The directory lists over 950 scientists and engineers with disabilities who are willing to act as consultants and advisors.

Barrier-Free in Brief: Access in Word and Deed (1991); available from

The American Association for the Advancement of Science
1333 H Street, N.W.
Washington, DC 20005
(202) 326-6630 (V/TDD)

This booklet includes a directory of 80 experts who will consult on science and disability issues.

For more information on assistive technology

RESNA, an association for the advancement of rehabilitation and assistive technologies
1101 Connecticut Avenue, N.W., Suite 700
Washington, DC 20036
(202) 857-1199

RESNA staff can answer specific questions about adapting labs and classrooms for people with disabilities. RESNA also publishes the *Technology for Independent Living Sourcebook*, a complete reference on available technology and sources of funding, as well as other resources.

Technical Assistance Resource Center
1101 Connecticut Avenue, N.W.
Washington, D.C. 20036
(202) 857-1140 (V/TDD)

This is the national network of the Technology-Related Assistance for Individuals with Disabilities Act of 1988 (known as the Tech Act). The legislation gives grants to states to develop and implement a statewide program to assist people with disabilities to understand and use assistive technology. This technology can be anything from a page-turner to a wheelchair or a computer. The Center will refer you to the program closest to you.

The Workplace Workbook: An Illustrated Guide to Job Accommodation and Assistive Technology, by James Mueller, from RESNA (above) or
The Dole Foundation
1819 H Street, N.W., Suite 850
Washington, DC 20006
(202) 457-0318 (V/TDD)

ABLEDATA
Newington Children's Hospital
181 E. Cedar Street
Newington, CT 06111
(800) 344-5405 (V/TDD)

National Rehabilitation Information Center (NARIC)
8455 Colesville Road, Suite 935
Silver Spring, MD 20910-3319
(301) 588-9284 (V/TDD)
(800) 346-2742 (V/TDD)

Closing the Gap
P.O. Box 68
Henderson, MN 56044
(612) 248-3294

This organization provides information on software, hardware, and other technology in special education and rehabilitation through a newsletter.

Alliance for Technology Access
1307 Solano Ave.
Albany, CA 94706-1888
(415) 528-0747 (V/TDD)

This is a national network of community-based, computer-learning centers for young people with disabilities and their families.

Rehab Engineering Center (REC) on Access to Computers and Electronic Equipment
University of Wisconsin/Madison
Trace Center
1500 Highland Avenue
Madison, WI 53705
(608) 262-6966 (Voice)
(608) 263-5408 (TDD)

Rehabilitation Engineering Center (REC) on Rehabilitation Technology Transfer
Electronics Industries Foundation
919 18th Street, NW, Suite 900
Washington, DC 20006
(202) 955-5823

For more information on accessible labs and classrooms
Barrier-Free in Brief: Laboratories and Classrooms in Science and Engineering
The American Association for the Advancement of Science
1333 H Street, N.W.
Washington, DC 20005
(202) 326-6630 (V/TDD)

Teaching Chemistry to Physically Handicapped Students, edited by Kenneth M. Reese, American Chemical Society, 1981, revised 1985; available from
Committee on Chemists with Disabilities
American Chemical Society
1155 16th Street, N.W.
Washington, DC 20036
(202) 955-5823 (V/TDD)

This publication was designed for chemistry instructors, but offers many suggestions that are applicable to all science laboratories and classrooms.

For more information on campus accessibility, teaching and testing accomodations
HEATH Resource Center
American Council on Education
One Dupont Circle, Suite 800
Washington, DC 20036-1193
(202) 939-9320 (V/TDD)
(800) 544-3284 (V/TDD)

HEATH is the national clearinghouse on post-secondary education for persons with disabilities. HEATH can provide information and referral on a wide range of topics involving students and others with disabilities in the higher education community.

Association on Handicapped Student Service Programs in Post-Secondary Education (AHSSPPE)
P.O. Box 21192
Columbus, OH 43221
(614)488-4972 (V/TDD)

AHSSPPE is an association of disability support service offices (DSSOs) from over 600 institutions of higher learning. AHSSPPE promotes information sharing through a bimonthly newsletter, a national database, and special interest task forces. It provides information on laws and testing accommodations for students with disabilities.

For more information on helping students who are deaf or hard-of-hearing
Alexander Graham Bell Association for the Deaf (AGB)
3417 Volta Place, N.W.
Washington, DC 20007
(202) 337-5220 (Voice/TDD)

National Information Center on Deafness
Gallaudet University
Carnegie Hall, Room 205
800 Florida Avenue, N.E.
Washington, DC 20002
(800) 672-6720 (V/TDD)

Self-Help for Hard-of-Hearing People (SHHH)
7800 Wisconsin Avenue
Bethesda, MD 20814
(301) 657-2248
(301) 657-2249 (TDD)

The Washington Area Group for the Hard-of-Hearing
P.O. Box 6283
Silver Spring, MD 20916
(301) 942-7612 (V/TDD)

These organizations will provide information on a wide range of topics affecting students who are deaf or hard-of-hearing, including assistive listening devices and adapted technology.

For interpreters:
National Registry of Interpreters for the Deaf
814 Thayer Avenue
Silver Spring, MD 20910
(301) 588-2406 (V/TDD)

National Technical Institute for the Deaf
Rochester Institute of Technology
One Lomb Memorial Drive
Rochester, NY 14623
(716) 475-6400 (Voice/TDD)

For information on captioning:
Modern Talking Picture Service
5000 Park Street, North
St. Petersburg, FL 33709
(800) 237-6213 (V/TDD)

This service provides a variety of captioned films, including scientific films.

The Caption Center
WGBH
125 Western Avenue
Boston, MA 02134
(617) 492-9225 (V/TDD)

This service will develop captions for video tapes and also Descriptive Video Service (DVS) for persons with visual impairments. It captions NOVA and other educational videos.

For more information on communication aids and technology for people who cannot speak

Communication Outlook
Artificial Language Laboratory
Michigan State University
405 Computer Center
East Lansing, MI 48824
(517) 353-0870

This is an international quarterly for individuals interested in the application of technology to the needs of persons with communication impairments due to neurological, sensory, or neuromuscular conditions.

For more information on helping students who are blind or visually impaired

American Council of the Blind (ACB)
1010 Vermont Avenue, N.W., Suite 1100
Washington, DC 20005
(202) 393-3666
(800) 424-8666

ACB is a national consumer and advocacy organization composed primarily of blind or visually-impaired people. ACB affiliates include a teacher and a student group.

American Foundation for the Blind (AFB)
15 West 16th Street
New York, NY 10011
(212) 620-2000
(800) 232-5463

AFB will provide information about issues involving students who are blind or visually impaired. It also operates an information center on technology for home, work, classroom, and lab.

National Federation of the Blind (NFB)
1800 Johnson Street
Baltimore, MD 21230
(301) 659-9314

NFB is a consumer group which can answer questions about blindness or refer people to appropriate resources.

Recording for the Blind, Inc. (RFB)
20 Roszel Road
Princeton, NJ 08540
(609) 452-0606

RFB provides cassette recordings of educational and professional books. Over 79,000 titles are currently available; other titles are recorded on request. RFB is currently conducting a special project to expand its collection of science textbooks. The materials are provided on loan; there is a one-time starter fee of $25, and no further charge.

Computerized Books for the Blind (CBFB) has merged with RFB to produce books on computer diskettes.

Descriptive Video Service (DVS)
WGBH
125 Western Avenue
Boston, MA 02134
(617) 492-2777

DVS is a new technology that makes television accessible to visually-impaired audiences.

For more information on helping students who have learning disabilities
National Center for Learning Disabilities (NCLD)
99 Park Avenue
New York, NY 10016
(212) 687-7211 or
(703) 451-2078

NCLD offers information, referral, advocacy and outreach for individuals with learning disabilities

For more information on helping students who have mobility impairments

Spinal Cord Injury Hotline
American Paralysis Association (APA)
c/o Montebello Hospital
2201 Argonne Drive
Baltimore, Maryland 21218
(800) 526-3456

The Spinal Cord Injury Hotline is an information and referral service for people with spinal cord injury.

Spinal Network (Publishers of the resource book, Spinal Network and quarterly magazine, *Spinal Network, Extra.*)
Spinal Associates, Ltd.
P.O.B. 4162
Boulder, CO 80306
(303) 449-5412

Fisher Scientific Co.
30 Water Street
West Haven, CT 06516
(203) 934-5271

Fisher manufactures a portable lab station for students with orthopedic impairments.

For resources on recreation
National Handicapped Sports
415 Hungerford Drive
Suite 100
Rockville, MD 20850
(301) 217-0960

National Ocean Access Project (NOAP)
P.O. Box 33141
Farragut Station
Washington, D.C. 20033
(301) 217-9843

National Therapeutic Recreation Society
3101 Park Center Drive
Alexandria, VA 22302
(703) 820-4940

Skating Association for the Blind and Handicapped
Silbey's Boulevard Mall Store
Niagara Falls Boulevard
Amherst NY 14226
(716) 833-2994

United States Association for Blind Athletes
33 N. Institute St.
Brown Hall
Suite 105
Colorado Springs, CO 80903
(719) 630-0422

Voyageur Outward Bound School
10900 Cedar Lake Road
Minnetonka, MN 55343
(612) 542-9255

Wilderness Inquiry II
1313 5th St. S.E., Box 84
Minneapolis, MN 55414
(612) 379-3858 (V/TDD)

For more information on adaptations to disability in farm and rural settings
Breaking New Ground
1146 Agricultural Engineering Building
Purdue University
West Lafayette, IN 47907
(317)494-5088

Alexandra Enders
Rural Institute on Disabilities
52 Corbin Hall
Missoula, MT 59812
(406) 243-5481 (V)
(406) 243-2243 (TDD)

For more information on the most recent science books and films for students of all ages

Science Books & Films
American Association for the Advancement of Science
1333 H Street, N.W.
Washington, D.C. 20005
(202) 326-6446
$35 for one year (9 issues)

For more information on encouraging children in math and science

Notes for Parents
American Association for the Advancement of Science
Directorate for Education and Human Resources
1333 H Street, N.W.
Washington, D.C. 20005
(202) 326-6470
(Available in English and Spanish)

"Science-by-Mail"
AAAS
1333 H Street, NW
Washington, DC 20005
(202) 326-6602

This pen-pal project, started in cooperation with the AAAS Science and Technology Centers Project at the Museum of Science in Boston, links students and scientists in challenging scientific partnerships.

For more information on accessible museums and exhibits
Association of Science and Technology Centers (ASTC)
1025 Vermont Avenue N.W., Suite 3500
Washington, DC 20005
(202) 783-7200

ASTC creates and coordinates informal science exhibits and programs in science and technology centers throughout the country.

User-Friendly Hands-On Exhibits that Work, by Jeff Kennedy, is available from ASTC for $25.00

People with Disabilities: An Untapped Source of Museum Volunteers
American Association for the Advancement of Science
Project for Science, Technology and Disability
1333 H Street, N.W.
Washington, D.C. 20005
(202) 326-6430 (V/TDD)

If your local science museum is not fully accessible, you might recommend that they contact the exhibit accessibility experts listed below:

Jan Majewski
Smithsonian Accessibility Coordinator
Office of the Assistant Secretary for Museums
Arts & Industries Building, Room 1410
Smithsonian Institution
Washington, DC 20560
(202) 786-2942
(202) 786-2414 (TDD)

Paula Terry
Special Constituencies
National Endowment for the Arts
1100 Pennsylvania Avenue, N.W.
Washington, DC 20506
(202) 682-5531
(202) 682-5496 (TDD)

Betty Davidson
Exhibits Department
The Museum of Science
Science Park
Boston, MA 02114
(617) 589-0285
(617) 227-3235 (TDD)

Ellen Ruth Lieber
Access/Abilities
P.O. Box 458
Mill Valley, CA 94942
(415) 388-3250

New Dimensions for Traditional Dioramas: Multisensory Additions for Access, Interest and Learning, by Betty Davidson
Available from
Dept of Publications
The Museum of Science
Boston, MA 02114
(617) 589-0245
Cost: $23.00

The Arts and 504, a booklet on museum access, is available from
Superintendent of Documents
Government Printing Office
Washington, DC 20402
(202) 783-3238
Stock# 036-000-00047-3
$5.00

For more information about barrier-free meetings
Barrier Free in Brief: Workshops and Conferences for Scientists and Engineers (1991); available from
The American Association for the Advancement of Science
1333 H Street, N.W.
Washington, DC 20005
(202) 326-6630 (V/TDD)

About AAAS

The American Association for the Advancement of Science (AAAS) was founded in 1848 and has become the world's largest federation of scientific and engineering societies, with over 130,000 members and nearly 300 affiliate societies and academies of science. AAAS publishes *Science*, a weekly professional journal, *Science Books & Films*, a source of critical reviews of educational materials for schools and libraries, and numerous other publications.

AAAS programs and activities aim to broaden the human resource pool of scientists and engineers, shape science and technology policy, increase public understanding of science, expand scientific cooperation in global issues, defend scientific freedom, and raise professional standards.

The AAAS Directorate for Education and Human Resources Programs seeks to improve formal and informal education in mathematics, science and technology; to foster equal access to careers in these fields for women, minorities, and people with disabilities; and to enhance the public's understanding of all areas of science.

The Directorate's Project on Science, Technology and Disability strives to improve access to science and engineering education and careers for people with disabilities. Among its programs are the Project on Access to Engineering, the *Resource Directory of Scientists and Engineers with Disabilities*, and support for out-of-school activities for young people with disabilities.