Safe Outdoor Learning Environment:

A RASEM²
RAISE pac

for students in kindergarten
in a classroom and outdoor setting

November 2, 2004

RASEM² is funded by the
National Science Foundation
grant # HRD-0124198

Created by:

PROJECT DIRECTORS

Lisa Becker
Sherry Thompson
Patti Roll
Las Mesa Elementary School
Plainview Independent School District
Plainview, TX

Developed by:

CORRIDOR, INC.
LAS CRUCES, NM

Steve Stile, Ph.D.
Senior Instructional Designer

Melissa Chavez, M.A.
Associate Instructional Developer

Produced by:

RASEM²
COLLEGE OF ENGINEERING
NEW MEXICO STATE UNIVERSITY
LAS CRUCES, NM

William C. McCarthy, Ph.D., Project Director

Ed Misquez, Project Associate Director

Richard Turietta, Teacher Outreach Program Coordinator

Yvette Crofford, Project Research Specialist

Randy Thornley, Project Research Specialist

An electronic version of this RAISE Pac is available at http://rasem.nmsu.edu.

Table of Contents

Overview...

The following is an overview of the *Safe Outdoor Learning Environment* project.

Recommended age and grade levels	The *Safe Outdoor Learning Environment* project is most appropriate for kindergarten students with and without disabilities.
What students do	Through the construction of a water and physical activity playground center, special education students can fully participate in outdoor activities as part of an ocean science curriculum. Students will * determine if objects sink or float * sort treasures they dig up in the sand into pennies and shells * estimate/predict how much water a sponge can hold * explain how wind affects blowing bubbles * explain the effects of gravity on beach volleyball
Context for the activity	This project is designed to be offered in a classroom and on an outdoor playground.
Special arrangements and sources of expenditures for the project sponsors	* concrete path around outdoor playground area to provide accessibility * lumber * labor for laying concrete * outdoor equipment * outdoor writing/painting boards
Costs and special materials for the participants	* none

Outcome objectives	The *Safe Outdoor Learning Environment* project was created to accomplish several broad objectives: * develop an understanding of science, technology, engineering and mathematics principles * develop an understanding of science, and its applications * instill the realization in each student that becoming a scientist or a science professional is within his or her grasp regardless of background, family income level, prior family educational accomplishment, culture, ethnicity, or family origin * develop skills and thinking processes of "doing science" * develop specific skills directly preparing students to perform better on standardized achievement tests * foster an enthusiasm and propensity for scientific inquiry as a life-tool * foster a love of learning math and science * develop the ability to explain predictions and results in science experiments * help children develop skills and thinking processes needed to do science experiments * apply math skills to activities
Caveats/Special Considerations	* Plan activities so that all children with disabilities can participate * Meet with maintenance department for district to lay concrete * Arrange for adult volunteers to run each learning station

Students to be served...

The RAISE Pac, *Safe Outdoor Learning Environment*, is designed to meet the needs of kindergarten grade students with and without disabilities and their teachers. This packet can be used as instructional enrichment with groups or classes of high-performing grade students. This packet can also be used with groups or classes of grade students showing slower than typical academic growth.

RESPONSIVE TO THE NEEDS OF STUDENTS WITH DISABILITIES OR AT-RISK FOR FAILURE

Beyond being a solid addition to the standard science curriculum, this RAISE Pac is designed to be responsive to the needs of students with disabilities as well as low-income Hispanic and Native American students, and at-risk students. The addition of this feature significantly increases the appeal of the final product. This RAISE Pac addresses the alarming phenomenon of depressed school success rates among certain groups. It emphasizes to students that they have opportunities to participate in science and science-based professions regardless of their disability, ethnicity, or background.

The table below gives general guidelines for accommodations. It is highly recommended that specific accommodations be addressed on a case by case basis so that each student will receive the accommodations that best prepare him/her for success.

GENERAL GUIDELINES FOR ACCOMMODATIONS

Disabilities	Recommended Accommodations
All	* Ask the student if help is required before providing assistance. * Talk directly to the student rather than through an interpreter or personal assistant. * Use respectful terminology regarding the student's disability. * Provide information in several modalities (e.g., visual, auditory, tactile, etc.).
Autism	* Provide basic assistance in starting new activities. * Communicate clearly and patiently.
Behavior Disorders	* Follow established behavioral plans. * Other modifications as deemed necessary.
Communication Disorders	* Listen carefully. * Restate the student's questions or statements and ask for verification.

Developmental Disabilities	* Provide 1:1 instruction as necessary. * Communicate clearly and patiently.
Emotional Disorders	* Communicate in a clear, calm, and respectful manner. * Provide 1:1 assistance as necessary.
Hearing Impairments	* Provide preferential seating for presentations. * Provide a sign language translator as needed. * Face the student and speak clearly to facilitate lip reading. * Repeat questions from the audience.
Learning Disabilities	* Read instructions aloud. * Provide extended time on tasks as needed.
Mobility Impairments	* Arrange the environment for easy access. * Communicate at the student's eye level. * Provide accommodations following the Americans with Disabilities Act (e.g., wheelchair ramps).
Other health impairments	* Provide limited or alternative activities as needed (e.g., for students with asthma or heart conditions). * Provide other assistance as necessary.
Visual Impairments	* Provide large print or braille translations for handouts, braille keyboards, adaptive manipulatives, etc. as needed. * Provide preferential seating for presentations. * Use clear, verbal descriptions of presentations, equipment, locations of objects, etc. * Show respect for the student's service dog and his/her need for guidance while walking. * Provide subject-specific text(s) is available. * Provide laptop computer with accessibility options if available.

Instructional outcomes...

OBJECTIVES:

* develop an understanding of science, technology, engineering, and mathematics principles
* develop an understanding of science, and its applications
* instill the realization in each student that becoming a scientist or a science professional is within his/her grasp regardless of background, family income level, prior family educational accomplishment, culture, ethnicity, or family origin
* develop the skills and thinking processes of "doing science"
* develop the specific skills directly preparing the student to perform well on standardized achievement tests
* foster an enthusiasm and propensity for scientific inquiry as a life-tool
* foster a love of learning math and science
* develop the ability to explain predictions and results in science experiments
* help children develop skills and thinking processes needed to do science experiments
* apply math skills to activities

SKILLS:

* following directions
* analytically thinking
* acquiring science inquiry skills
* developing/practicing communication skills
* developing/practicing writing skills
* practicing teamwork and collaboration
* conducting research using the World Wide Web
* understanding characteristics of science
* understanding the process of science
* understanding the creation and operation of science
* understanding characteristics of sink-float, sorting, gravity, wind, estimation
* understanding the process of conducting experiments

NATIONAL CONTENT STANDARDS:

Area	Standard	Benchmark
Science	Science as Inquiry: As a result of activities in grades K-4, all students should develop abilities necessary to do scientific inquiry, and understanding about scientific inquiry.	K-4 Benchmark: Understand scientists develop explanations using observations and what they already know about the world. Good explanations are based on evidence from investigations.
Science	Physical Science: As a result of activities in grades K-4, all students should develop an understanding of properties of objects and materials, position and motion of objects, and light, heat, electricity and magnetism.	K-4 Benchmark: Understand objects are made of one or more materials. Objects can be described by the properties of materials from which they are made, and those properties can be used to separate or sort a group of object or materials.
Math	Numbers and Operations: Understand numbers, ways of representing numbers, relationships among numbers, and number systems.	K-4 Benchmark: Count with understanding and recognize "how many" in sets of objects.

National content standards are taken from Education World web site. This web site compiles educational guidelines and standards developed by the National Council of Teachers of Mathematics, the National Council of Teachers of English, National Geographic Society, National Council on Economic Education, National Council for the Social Studies, Center for Civic Education, Consortium of National Arts Education Associations, National Center for History in Schools, International Society for Technology in Education (ISTE), and National Academies of Science.

For more information, visit www.educationworld.com/standards/national/index.shtml.

NEW MEXICO CONTENT STANDARDS:

Area	Standard	Benchmark
Science	Physical Science: Understand the structure and properties of matter, the characteristics of energy, and the interactions between matter and energy.	K-4 Benchmark I: Recognize that matter has different forms and properties.
Math	Numbers and Operations: Students will understand numerical concepts and mathematical operations.	K-4 Benchmark: Understand numbers, ways of representing numbers, relationships among numbers, and number systems.
Social Studies	Economics: Students understand basic economic principles and use economic reasoning skills to analyze the impact of economic systems (including the market economy) on individuals, families, businesses, communities, and government.	K-4 Benchmark IV-A: Understand that individuals, households, businesses, governments, and societies make decisions that affect the distribution of resources and that these decisions are influenced by incentives (both economic and intrinsic).

Recruiting students, parents, and helpers...

STUDENTS

Promotional fliers and permission slips should be sent to teachers. Teachers can then distribute the fliers and permission slips to the students in their classes. Another flier and permission slip can be mailed several weeks before the *Safe Outdoor Learning Environment* project is to begin. If parents and/or students are on a school email mailing list then email can also be sent.

Fliers can also be posted in businesses and organizations where kindergarten grade students and their parents are likely to visit. These could include music and video stores, clothing stores, grocery stores, public libraries, churches, etc.

Additionally, a public service announcement may be released to newspaper, radio, and television media companies. Media companies will often air a free public service announcement. Remember to give radio stations, television stations, and newspapers enough time to prepare your announcement before it airs.

PARENTS

A simple note, similar to the following, attached to the permission slip should be sufficient to solicit parental assistance. A follow-up telephone call to the parents is recommended.

Dear Parents,

On <indicate the day(s) and date(s) of the project>, we will offer a limited number of our students the opportunity to participate in a special science project. Students participating in this project will learn about different properties through outdoor activities. The *Safe Outdoor Learning Environment* project was developed by the National Science Foundation's RASEM^2 program in the College of Engineering at New Mexico State University.

In addition to being very interesting to students, the *Safe Outdoor Learning Environment* project has been designed to teach a large number of science skills and to stimulate students' interest in careers in science and technology.

Sincerely,
Teacher name

HELPERS

In addition to working with the students, volunteers can provide assistance in securing the materials and supplies from a service or professional group.

Helpers do not have to be parents. Consider contacting retired persons, such as scientists, engineers, and teachers, already working with the school or contacting Volunteers in Progress for enthusiastic and knowledgeable extra set of helping hands. You can modify the previous note.

COMMUNITY ASSISTANCE

To solicit assistance in purchasing supplies, consider contacting organizations such as the following:

* local businesses that are associated with the materials used to construct any kits or projects (home improvement stores, Radio Shack, hobby stores, etc)
* local businesses that have an interest in the *Safe Outdoor Learning Environment* project
* local service organizations (Rotary, Lions, Sertoma etc)
* local businesses that can offer support in other ways (e.g., contributing food, prizes, etc.)

The best way to solicit the support of businesses is to offer them something in return, such as a mention on a web page. Be sure they understand the tax deduction implications for their support.

Required materials...

In addition to standard classroom materials such as pencils, paper, scissors, etc., the execution of the *Safe Outdoor Learning Environment* project may require the following:

* computers with Internet access and PowerPoint (number of computers needed will depend on the number of participants.)[1]
* work area with table space to work on constructing the projects
* newspapers, drop cloths, or tarps to protect the tables
* objects that will sink or float
* pennies and shells
* variety of sizes of plastic fish
* volleyballs and net
* sponges
* bubbles and blower
* basketballs
* paint

Most science lab materials can be purchased from your school district's supplier, or from science supply companies like Pitsco or Fischer Scientific International Inc. To request a Pitsco catalog, call (800) 835-0686. To request a Fischer catalog, call (888) 840-0502.

[1] Computer access may be acquired through partnerships with local colleges or distance education institutions.

Activities...

The *Safe Outdoor Learning Environment* project involves a series of activities. The following sections provide a schedule of events and a description of each of the *Safe Outdoor Learning Environment* project activities.

SCHEDULE OF EVENTS

Day/Time	Event	Activity #
PRELIMINARY ACTIVITIES		
(To be completed before Ocean Day)		
Day 1; 1 hour	Water Graph	Activity 1
Day 2; 1 hour	Water Estimation	Activity 2
Day 3; 1 hour	Shell Sorting	Activity 3
Day 4; 1 hour	Sand Exploration	Activity 4
OCEAN DAY		
(Students rotate stations to engage in each activity)		
Day 5; 2 hours	Who Sank the Boat?	Activity 5
10-20 minutes	Digging for Treasure	Activity 6
10-20 minutes	Sorting Fish	Activity 7
10-20 minutes	Beach Volleyball	Activity 8
10-20 minutes	Sponge Soak	Activity 9
10-20 minutes	Blowing Bubbles	Activity 10

ACTIVITY 1

Title	Water Graph
Content Areas	* math
Materials for Teacher	* green and blue food coloring * two large clear jars * water
Materials for Students	* none
Step by Step Procedure	* Provide students with an explanation of the activity * Instruct students to think about if they prefer to take a bath or a shower * For the students who prefer to take a bath, instruct them to pour a cup of blue water in a clear jar * For the students who prefer to take a shower, instruct them to pour a cup of green water in another clear jar * When all the students have completed the task, instruct the students to compare the jars and determine if more children like to take a shower or a bath
Length of Time	* One hour
Assessment	* Ability to explain results of water levels in each jar

Activity-specific Accommodations	* All
	  * Assist students with disabilities as needed
	  * Group students with disabilities with students or classroom assistants who can help them
	* Visual impairments
	  * Provide clear verbal instructions
	  * Assist in determining blue or green water
	* Mobility impairments
	  * Arrange the environment for easy access
	  * Provide assistance with pouring for students with limited use of hands and arms

ACTIVITY 2

Title	Water Estimation
Content Areas	* math
Materials for Teacher	* chalkboard or dry erase board * baster * water * red food coloring
Materials for Students	* chalk or dry erase marker
Step by Step Procedure	* Provide students with an explanation of the activity * Instruct students they will have to take turns dipping a baster into red water, filling the baster, and squirting it into a clear jar * Instruct students to then make a tally mark on the board * When the jar is full, draw boxes around each set of five tallies * Instruct the class to count the tallies by fives * Ask students how many tallies it took to fill the jar * Draw circles around each set of ten tallies * Instruct the class to count the tallies by tens * Ask students how many tallies it took to fill the jar
Length of Time	* One hour
Assessment	* Ability to count by fives and tens * Ability to draw conclusions

Activity-specific Accommodations	* All
	  * Assist students with disabilities as needed
	  * Group students with disabilities with students or classroom assistants who can help them
	* Visual impairments
	  * Provide clear verbal instructions
	  * Assist in filling baster with water
	* Mobility impairments
	  * Arrange the environment for easy access
	  * Provide assistance with pouring for students with limited use of hands and arms

ACTIVITY 3

Title	Shell Sorting
Content Areas	* math * physical science
Materials for Teacher	* shells of different colors, sizes, shapes
Materials for Students	* none
Step by Step Procedure	* Provide students with an explanation of the activity * Determine sorting categories (e.g., shape, color, smooth/rough, etc.) * Divide students into small groups * Give each group a small bowl of shells * Instruct each group to sort the shells into teacher-decided categories * When students can successfully sort, allow them to determine their own categories
Length of Time	* One hour
Assessment	* correct sorting of shells * ability to create new categories

Activity-specific Accommodations	* All
	  * Assist students with disabilities as needed
	  * Group students with disabilities with students or classroom assistants who can help them
	* Visual impairments
	  * Provide clear verbal instructions
	  * Assist in identifying shells if visual properties are a category
	* Mobility impairments
	  * Arrange the environment for easy access
	  * Provide assistance for students with limited use of hands and arms

ACTIVITY 4

Title	Sand Exploration
Content Areas	* math * language development
Materials for Teacher	* sand * balance scale * miscellaneous classroom items
Materials for Students	* none
Step by Step Procedure	* Provide students with an explanation of the activity * As a class, ask children to list descriptive words for the bucket of sand * Individually, students will put the bucket on a balance scale and find items to weigh more than the sand * Individually, students will put the bucket on a balance scale and find items to weigh less than the sand
Length of Time	* One hour
Assessment	* Ability to explain/list items that weigh more and less than bucket of sand

Activity-specific Accommodations	* All
	  * Assist students with disabilities as needed
	  * Group students with disabilities with students or classroom assistants who can help them
	* Visual impairments
	  * Provide clear verbal instructions
	  * Assist in reading scale or find scale with enlarged numbers
	* Mobility impairments
	  * Arrange the environment for easy access
	  * Provide assistance for students with limited use of hands and arms

ACTIVITY 5

Title	Who Sank the Boat?
Content Areas	* science * math
Materials for Teacher	* variety of water-safe objects that will either sink or float * clear tub filled with water
Materials for Students	* none
Step by Step Procedure	* Provide students with an explanation of the activity * As a class, students will predict which items will sink and which will float * Individually, students will test their predictions
Length of Time	* 10-20 minutes
Assessment	* Ability to define sink and float * Ability to name one item that sank and one item that floated

Activity-specific Accommodations	* All
	  * Assist students with disabilities as needed
	  * Group students with disabilities with students or classroom assistants who can help them
	* Visual impairments
	  * Provide clear verbal instructions
	* Mobility impairments
	  * Arrange the environment for easy access
	  * Provide assistance for students with limited use of hands and arms

ACTIVITY 6

Title	Digging for Treasure
Content Areas	* math
Materials for Teacher	* pennies * shells * buckets * sand
Materials for Students	* none
Step by Step Procedure	* Before the activity, bury pennies and shells in sand buckets * Provide students with an overview of the activity * Instruct students to dig in the sand to find the buried pennies and shells * Instruct students to sort the items they find
Length of Time	* 10-20 minutes
Assessment	* correctly sorted items

Activity-specific Accommodations	* All
	  * Assist students with disabilities as needed
	  * Group students with disabilities with students or classroom assistants who can help them
	* Visual impairments
	  * Provide clear verbal instructions
	  * Assist in identifying shells and pennies by touch
	* Mobility impairments
	  * Arrange the environment for easy access
	  * Provide assistance for students with limited use of hands and arms

ACTIVITY 7

Title	Sorting Fish
Content Areas	* math * physical science
Materials for Teacher	* water table * dozens of different sizes of plastic fish
Materials for Students	* none
Step by Step Procedure	* Prepare the water table by adding plastic fish * Provide students with an overview of the activity * Instruct students to sort fish into large and small
Length of Time	* 10-20 minutes
Assessment	* correctly sorted items

Activity-specific Accommodations	* All
	  * Assist students with disabilities as needed
	  * Group students with disabilities with students or classroom assistants who can help them
	* Visual impairments
	  * Provide clear verbal instructions
	  * Assist in identifying fish by touch
	* Mobility impairments
	  * Arrange the environment for easy access
	  * Provide assistance for students with limited use of hands and arms

ACTIVITY 8

Title	Beach Volleyball
Content Areas	* science * gross motor
Materials for Teacher	* volleyball * volleyball net
Materials for Students	* none
Step by Step Procedure	* Set up volleyball net in sand pit * Provide students with an explanation of gravity * Provide students with an overview of activity * Provide students with explanation of rules of volleyball * Divide students into teams * Instruct students to play volleyball
Length of Time	* 10-20 minutes
Assessment	* Students will use their understanding of gravity to explain why ball falls to the ground when nobody can hit it

Activity-specific Accommodations	* All
	  * Assist students with disabilities as needed
	  * Group students with disabilities with students or classroom assistants who can help them
	* Visual impairments
	  * Provide clear verbal instructions
	  * Acquire a beeping ball so all students can participate
	* Mobility impairments
	  * Arrange the environment for easy access or assign students to be scorekeepers if they can't participate
	  * Provide assistance for students with limited use of hands and arms

ACTIVITY 9

Title	Sponge Soak
Content Areas	* math * physical science
Materials for Teacher	* sponges * tub filled with water * empty containers of same size
Materials for Students	* none
Step by Step Procedure	* Fill tub with water and set up two empty containers and sponges near the tub * Provide students with an overview of the activity * Instruct students to individually fill two sponges with water * Students then squeeze the sponges over two separate containers * Ask students to compare the water levels and state which sponge holds more water
Length of Time	* 10-20 minutes
Assessment	* Students will be able to compare the amounts of water soaked up by each sponge

Activity-specific Accommodations	* All
	  * Assist students with disabilities as needed
	  * Group students with disabilities with students or classroom assistants who can help them
	* Visual impairments
	  * Provide clear verbal instructions
	  * Assist in identifying sponges by touch
	* Mobility impairments
	  * Arrange the environment for easy access
	  * Provide assistance for students with limited use of hands and arms

ACTIVITY 10

Title	Blowing Bubbles
Content Areas	* science
Materials for Teacher	* bubbles * bubble blowers (for each student)
Materials for Students	* none
Step by Step Procedure	* Provide students with an overview of the activity * Ask students about the force of wind * Take students outside and ask them to describe the wind * Give each student a bubble blower and ask them to blow bubbles * Ask students to describe what they see
Length of Time	* 10-20 minutes
Assessment	* Students will explain that wind makes the bubbles move

Activity-specific Accommodations	* All
	  * Assist students with disabilities as needed
	  * Group students with disabilities with students or classroom assistants who can help them
	* Visual impairments
	  * Provide clear verbal instructions
	  * Assist in identifying bubble blowers by touch
	* Mobility impairments
	  * Arrange the environment for easy access
	  * Provide assistance for students with limited use of hands and arms

Methods for accommodating students...

Although each student's disability is unique and must be evaluated individually, there are some general adaptations for accommodating students. Here are several *general* adaptations that can be used to accommodate students with disabilities when working in different settings with the RAISE Pac S*afe* O*utdoor* L*earning* E*nvironment* project.

GENERAL ADAPTATIONS FOR INCLUSION

Different teachers approach new activities in different ways. Below are some suggestions for adapting activities, the environment, and materials for inclusion.[2] This worksheet can be created for each activity in the RAISE Pac, as well as other activities in the classroom.

Create a Working Adaptation Sheet

* unit title or name
* activity name
* a summary of objectives for the unit and for individual activities
* a list of any foreseeable difficulties students with disabilities could experience
* prioritize objectives for students with disabilities by eliminating anything unnecessary
* list adaptations of materials, instruction, or environment necessary for each activity
* take a systematic lesson planning approach that includes repetition and clarity
* develop systematic evaluation that is suitable for the activity

Environmental Adaptations Considerations checklist

* Seating position
    * near teacher, peer assistant, or paraprofessional
    * near chalkboard or presentation screen
    * near front of classroom or auditorium
    * alone or near classmates
    * in a quiet space
    * other
* Seating planned for
    * lunchroom
    * assemblies
    * outdoor presentations
    * all classes
    * other
* Rearrange physical space as needed
    * move desks

[2] Adapted from The Inclusive Classroom: Strategies for Effective Instruction, M.A. Mastropieri & T.E. Scruggs, Columbus, OH: Merrill Publishers, 2000.

    * move displays or presentation materials
    * other
* Reduce distractions
    * visual
    * auditory
    * motion
    * other
* Provide daily structure
    * first task when arriving to class
    * second task
    * third task
    * preparation for next class
    * other
* Provide designated places for storing student's items and class materials
    * desk
    * cabinet
    * other
* Provide orderly examples
    * organized desks or lockers
    * other

Checklist for Curriculum Materials for Inclusive Environments

* Do the materials provide sufficient opportunity for active student involvement?
* Are materials written comprehensibly to all students?
* Do materials perpetuate cooperative learning groups?
* Do materials allow for sufficient practice of key concepts before moving on to other content?
* Do materials provide simple means of frequent evaluation of the student's progress?
* Do materials include examples of persons with diverse backgrounds and learning abilities?
* Do materials provide modification recommendations for students with special needs?

ADAPTATIONS IN THE LAB

* **List rules**—Laboratory rules must be explained, posted, and strictly enforced. Speak privately with students with disruptive behaviors and explain the necessity of closely following the posted rules during science activities. Often, students enjoy the activities so much that they will try extra hard to control their behavior just to participate in them. Additionally, rules and all instructional materials should be available in braille for students with visual impairments. Braille copies should be given to the students before the activities so students will be able to prepare in advance.

* **Insure safety**—Stabilize all scientific equipment and materials to avoid unnecessary spills. Velcro can be used to attach lightweight objects to tables or trays. Large or heavy objects can be secured with string or placed in stable trays. Use large, clear labels on all equipment and materials, including braille labels for students with visual impairments. Be sure to allow sufficient space for mobility and access for students with physical and visual impairments.

* **Prepare for spills**—Prepare areas for spills by having plenty of clean-up materials handy. Place tarps on the floor before engaging in activities that may result in spills. Have students bring extra large shirts to serve as "lab coats." Put felt on desk surfaces to help stabilize materials.

* **Give clear directions**—Be sure directions are clearly communicated. List directions on the board or overhead projector so students can refer to them easily. Provide preferential seating for students with sensory impairments. Color code tasks by order of importance. Provide adapted lab booklets in order to accommodate students with learning disabilities, developmental disabilities, or visual impairments. Make braille, textured, or enlarged print versions of lab booklets and other materials as appropriate. Furnish check lists for students who have difficulty completing longer tasks. Frequently check on students with developmental disabilities who are participating in cooperative groups to see that all students are active participants, rather than observers while their peers complete all the work. Assign volunteers to act as peer tutors or group supervisors.

* **Enhance stimulus value**—Implement closed circuit television to accommodate students with low vision to help them see all phenomena being observed in labs. Acquire extra lighting and magnification devices to help visibility. Acquire extra microphones and other devices to accommodate students with hearing impairments.

* **Make adaptations for teaching process skills**—Obtain adaptive equipment for *measuring and constructing* activities. These can include enlarged labels in print and braille formats or enlarged type on enlarged rulers and number lines. Use labels and charts for students with reading and writing difficulties. Group students with and without disabilities to work cooperatively.

* **Provide direct instruction**—As needed, provide 1:1 or small group instruction on difficult concepts such as science inquiry skills, project construction, using computer software, and special vocabulary.

* **Monitor progress**—Increase the amount of time per lab session and/or provide additional lab sessions for students who need to work at a slower, more appropriate rate. Check frequently to verify whether the students understand the assignment and the purpose of the lab activities.

* **Provide interpreters**—Provide interpreters for students with hearing impairments. Ideally the interpreter should be "science aware/savvy" and be able to communicate scientific principles. However, the interpreter should not be considered a science tutor or teacher's assistant.

ADAPTATIONS IN THE CLASSROOM

* **When providing instruction**-use overhead projectors and other types or adaptive or alternative technology, and provide instruction both orally and in writing. Concrete materials (such as handouts) are useful in providing a student with a system for fact-checking and clarification.

* **During testing**-Encourage students to use relaxation and other stress-reducing techniques during exams. Allow students extra time on tests, even if it means allowing them to take short breaks.

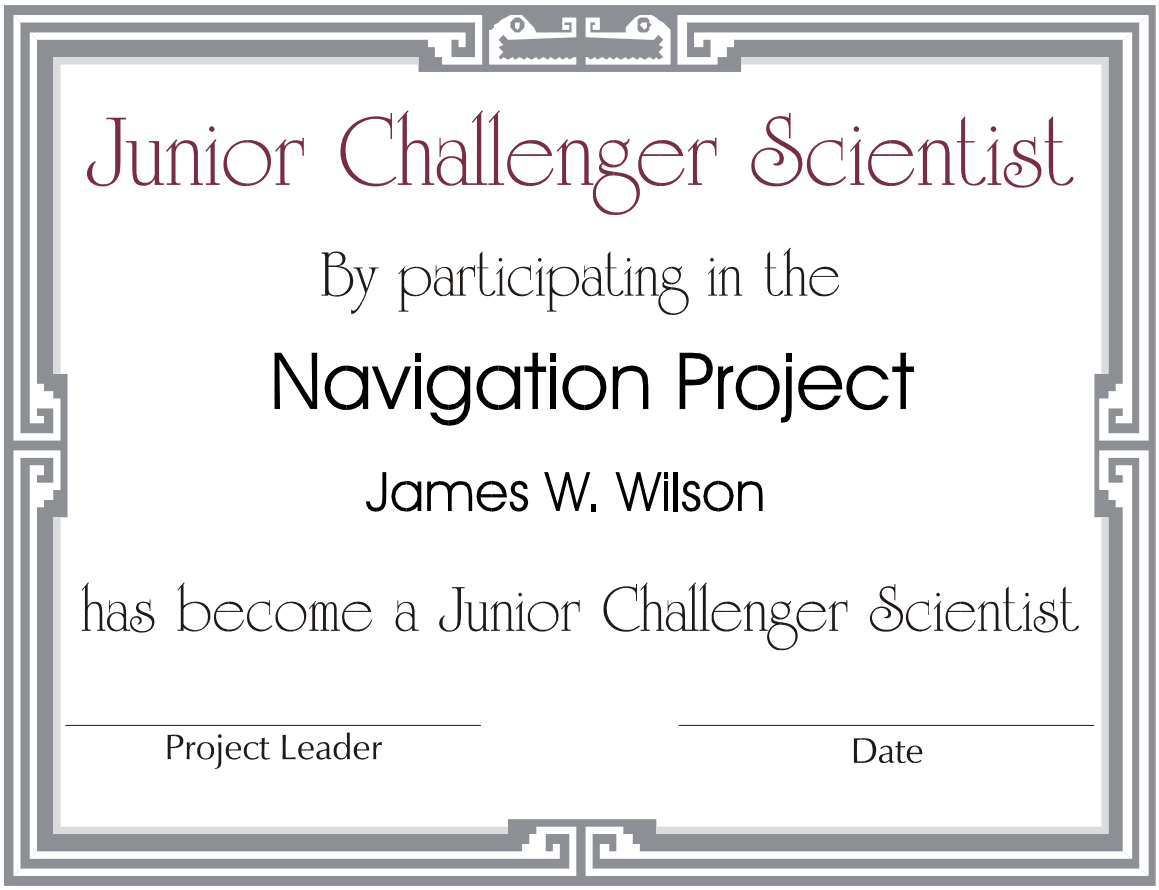
* **Group activities**-Encourage classmates to accept the student with disabilities and to be patient when communicating, or with any activity that may require physical participation. It may be useful to allow more time for group activities and to assign tasks within the group to individual students.

* **Research**-Review and explain to the student the steps involved in a research activity. Think about which steps may be difficult for the specific limitations of the student and plan accommodations ahead of time.

After the Safe Outdoor Learning Environment project is finished...

The *Safe Outdoor Learning Environment* project should be followed up with a thank you letter to the parents and participants. We also like to send to each of the participants a "Junior Challenger Scientist" identification card or certificate. Letters should also be sent to the teachers of students who attended to thank them for their help.

Below is a sample certificate. Blank certificate paper can be purchased from most office supply stores.



Participant packet...

The following is the list of things we recommend including in the participant packet. Following this list are several sample forms. We recommend having the forms reviewed by your organization's attorney to assure their completeness for your community and state.

Item in the packet	Description
Letter to parents	A letter informing the parents or guardians that the student was accepted for participation in the *Safe Outdoor Learning Environment* project. The letter should contain: * the list of items in the participant packet * name, phone number, fax number, e-mail address, and mailing address for the *Safe Outdoor Learning Environment* project contact person. A TTY number should be included. * instructions on which forms to return and where to send them
Letter to student	A short letter to the student explaining that he/she was accepted for the *Safe Outdoor Learning Environment* project. The letter should tell student such information as: * why the *Safe Outdoor Learning Environment* project will be fun and exciting * the kinds of activities students will do at the *Safe Outdoor Learning Environment* project * where the *Safe Outdoor Learning Environment* project will be held * the schedule of start times and stop times, lunch time, etc.
Stamped, self-addressed envelope	This envelope is used to return the necessary forms.
An RSVP form	An RSVP form to be returned by the parent or guardian. The form should have a blank for the parent's name and the student's name. The RSVP form should include a place for parents to designate which individual(s) is/are authorized to pick up the student. The form should be signed.
A reminder card	A postcard sized note for the parent to post at home as a reminder of the *Safe Outdoor Learning Environment* project. This note should be colorful and eye-catching.

A procedures sheet	This sheet will inform the parent about such things as: * where, when, and how to bring the student to the *Safe Outdoor Learning Environment* project each day * where, when, and how to pick up the student each day * describe safety precautions and procedures you will follow to prevent an unauthorized adult from picking up the student * information on parking * how medical emergencies will be handled and what to do if the student must take medication during the day * how the parent can contact a *Safe Outdoor Learning Environment* project staff person about a special concern they may have or a special need of their student The procedures sheet should also provide any "Do's and Don'ts" associated with the *Safe Outdoor Learning Environment* project.
A map	If necessary, include a map with directions to the site at which the *Safe Outdoor Learning Environment* project will be held.
Safe Outdoor Learning Environment project schedule	Include a schedule of events for parents and the student.
Medical, emergency, and form.	See attached example.
Child pickup authorization	See attached example.
List of staff	A list of key staff, the organization they represent, and the role they play in the *Safe Outdoor Learning Environment* project.
Press release	See attached example.

SAMPLE MEDICAL AND EMERGENCY INFORMATION FORM

Medical and Emergency Information Form

Dear Parent,

By filling out and signing this form, you are giving permission to the *Safe Outdoor Learning Environment* project to take appropriate action in the event of an emergency involving your child. You are also authorizing the *Safe Outdoor Learning Environment* personnel to transport your student to any location related to the *Safe Outdoor Learning Environment* project activities. Parents will be informed in advance of such travel. We are not responsible for accidents that may occur during our activities and transportation or for costs incurred.

	Contact Information (Please fill out completely):
Participating student	Name: _____ Age: _____
Parent or Guardian	Name: _____ Home phone: _____ Work phone: _____ Cell phone: _____
Alternative emergency contact	Name: _____ Home phone: _____ Work phone: _____ Cell phone: _____
Physician	Name: _____ Office phone: _____
Health Concerns, Medications, Allergies, Accommodations	
Short description of any health problems that may exist (use back side if necessary)	
Medications (please list and add any additional information we may need about medications)	
Allergies	
Special accommodations	

Medical information will be regarded as confidential and will be used only by the S*afe* O*utdoor* L*earning* E*nvironment* project staff on a need to know basis. Confidential medical information will remain confidential and will not be released except under provisions as required by law.

_____ _____

(Signature of Parent or Legal Guardian) (Today's Date)

SAMPLE CHILD PICK-UP AUTHORIZATION

Child Pick-up Authorization

The following people are authorized to pick-up my child from the *Safe Outdoor Learning Environment* project.

Authorized Person #1	Name: _____ Telephone: _____
Authorized Person #2	Name: _____ Telephone: _____
Authorized Person #3	Name: _____ Telephone: _____

Child's name: _____

Parent or legal guardian signature: _____

Date: _____

SAMPLE PRESS RELEASES

The following press releases are provided as examples. Your school or organization probably has a standard form that you will want to use instead of the following.

Student Press Release

On behalf of my child, _____
(Child's Name)

I hereby give the *Safe Outdoor Learning Environment* project irrevocable right and permission to use, publish, and retain copyright to any and all images, photographs, video, audio, and other likenesses of me for all media and all forms. I recognize them as the property of the *Safe Outdoor Learning Environment* project, solely and completely. I hereby release the *Safe Outdoor Learning Environment* project from any and all claims including libel and invasion of privacy, resulting from the use of the aforementioned images.

Parent's Signature:_____ Today's Date_____

Parent Press Release

I _____
(Please Print Name)

hereby give the *Safe Outdoor Learning Environment* project irrevocable rights and permission to use, publish, and retain copyright to any and all images, photographs, video, audio, and other likenesses of my child for all media and forms. I recognize them as the property of the *Safe Outdoor Learning Environment* project, solely and completely. I hereby release the *Safe Outdoor Learning Environment* project from any and all claims including libel and invasion of privacy, resulting from the use of the aforementioned images.

Parent's Signature:_____ Today's Date_____

Assistive Software and Web sites

There is a variety of assistive software and Web sites available to science teachers of students with disabilities.[3]

Access to Math
An onscreen talking math worksheet that allows students with learning disabilities to learn math at their own pace.
Availability: Commercial product
Contact: Don Johnston Inc. USA
Phone: (847) 526-2682
Fax: (847) 526-4177
E-mail: info@donjohnston.com

American Sign Language Dictionary by Multimedia 2000
Collection of 2200 Video Clips of signs, learning games, animations, and finger spelling.
Availability: Commercial Product
Contact: Multimedia 2000 USA
Phone (206) 622-5530
Fax (206) 622-4380
E-mail:webmaster@m-2k.com

ASL Finger Spelling by Scott Gaertner
This program helps users learn American Sign Language finger spelling, and can accommodate varying levels of user competency.
Availability: Freeware
Contact: Scott Gaertner USA
E-mail: srg@where.com

The Arc
The Arc of the United States works through education, research, and advocacy to improve the quality of life for children and adults with mental retardation and related developmental disabilities.
URL: http://www.thearc.org

Braille Keytop labels by Hooleon Corp.
This product features a 101-style keyboard in a combination of raised Braille characters and high contrast, large print on adhesive labels, which adhere directly to the top of the keyboard's key.
Availability: Commercial product
Contact: Hooleon Corp. USA

[3] Adapted from Ed Keller's Disabilities, Teaching Strategies, and Resources web site, http://www.as.wvu.edu/~scidis.

Phone: (800) 937-1337
Fax: (520) 635-4620
E-mail: info@hooleon.com

Conductdisorders.com
This web site contains articles, recommended books, forum and more.
URL: http://www.conductdisorders.com/

Co: Writer 4000 by Don Johnston Inc.
Co: Writer is a writing assistant with intelligent word prediction, useful for those who struggle with writing because of injury, physical limitation, language delay, or learning disability. Co: Writer is suitable for all vocabulary levels, and the speech output gives auditory feedback to those who need to hear their words.
Availability: Commercial product
Contact: Don Johnston Inc. USA
Phone: (847) 526-2682
Fax: (847) 526-4177
E-mail: info@donjohnston.com

Creature Antics by Laureate Learning Systems Inc.
Designed for those with severe difficulties, this program has a cast of animated characters helping users begin learning about cause and effect and turn-taking.
Availability: Commercial product
Contact: Laureate Learning Systems, Inc.
Phone: (802) 655-4755
Fax: (802) 655-4757
E-mail: customer-service@laureatelearning.com

Discover: Kenx by Don Johnston Inc.
Kenx is the Macintosh computer interface that provides keyboard and mouse alternates that enable people with physical or cognitive limitations to access their computers. Kenx, a software and hardware combination allows many types of alternate input devices to communicate with computers. Other capabilities of Kenx include CD quality speech for auditory feedback that enables users to use their computer for communication.
Availability: Commercial product
Contact: Don Johnston Inc.
Phone: (847) 526-2682
Fax: (847) 526-4177
E-mail: info@donjohnston.com

Duxbury Braille Translator version 10.2 (DBT MAC) by Duxbury System Inc.
DBT for MAC includes full word-processing of both print and Braille versions of a document, automatic translation between the two, complete Nemeth Braille translation, accepts Braille clipart, and much more. Files are compatible with the latest DBT for windows and MS-DOS.
Availability: Commercial product
Contact: Duxbury Systems Inc.
Phone: (978) 486-9766
Fax: (978) 486-9712

E-mail: info@duxsys.com

Dyna Vox Mac by Dyna Vox Systems Inc.
Dyna Vox software can be used to create dynamically linked communication pages for those with special speech, language, and learning needs.
Availability: Commercial product
Contact: Dyna Vox Systems Inc.
Phone: (888) 697-7332
E-mail: sales@dynavoxsys.com

Early Learning I, II, III by Marblesoft
Early Learning I includes four activities that teach pre-reading skills; Early Learning II includes four activities that teach addition and numbering sequencing; Early Learning III includes three activities that teach subtraction and number comparison.
Availability: Commercial product
Contact:Marblesoft USA
E-mail: mail@marblesoft.com

Fast Forward
This is recommended software for children with Autism to help build early learning skills.
Address: Scientific Learning, 300 Frank H. Ogawa Plaza, Suite 500, Oakland, CA 94612-2040
Phone: (888) 665-9707
Fax: (510) 444-3580
E-mail: info@scilearn.com
URL: http://www.fastforward.com

Following Directions: Left and Right by Laureate Learning Systems Inc.
This program offers ten activities to help students learn to follow directions, understand the difference between left and right; it is accessible through keyboard, touch screen, or single switch.
Availability: Commercial product
Contact: Laureate Learning Systems, Inc.
Phone: (802) 655-4755
Fax: (802) 655-4757
E-mail: customer-service@laureatelearning.com

Interactive Sign Language Fingerspelling and Numbers by Palantine Inc.
This software is a language-training program that translates a typed letter, number, or word into finger spelling signs. Interactive Sign Language aims to improve comprehension and increase signing speed.
Availability: Commercial product
Contact: Palatine Inc.
Phone: (800) 475-1119
Fax: (206) 933-6301
E-mail: info@palatine.com

Kurzweil 3000 for Macintosh by Kurzweil Educational
The Kurzweil 3000 for Macintosh is helping to meet the challenge of reading caused by dyslexia, attention deficit disorder, and other disorders. Kurzweil 3000 reads scanned books or electronic

text aloud using synthetic speech. This patented auditory and visual presentation of information helps measure reading accuracy, speed, and comprehension for struggling readers.
Availability: Freeware
Contact: Kurzweil Educational USA
Phone: (800) 894-5374
Fax: (781) 203-5033
E-mail: info@kurzweiledu.com

Micro-LADS:MicroComputers Language Assessment and Development System by Laureate Learning Systems Inc.
Designed to train 46 basic syntactic structures, this is aimed at the special needs of those with disabilities and impairments, accessible with keyboard, touch screen, single switch, or mouse.
Availability: Commercial product
Contact: Laureate Learning Systems, Inc.
Phone: (802) 655-4755
Fax: (802) 655-4757
E-mail: customer-service@laureatelearning.com

Surftalk by Digital Dreams
Surftalk is a voice-recognition application for the Internet that enables users to navigate the world wide web using spoken commands. Surftalk also allows web sites to speak to visitors using speech synthesis.
Availability: Commercial product
Contact: Digital Dreams, USA
Phone: (510) 547-6929
Fax: (510) 547-6799
E-mail: dreams@surftalk.com

Sweet Writer version 1.0 by Crescendo Software
This text writing application was designed for vision impaired users.
Availability: Shareware
Contact: Crescendo Software
E-mail: chris@screcendosw.com

Talking Keys Pro version 2.0 by Graham Software Co.
This software has been designed for blind and visually impaired users. Every command and keystroke can be spoken. It features a word processor, a pronunciation editor, and file commands that can be used by a blind user.
Availability: Commercial product
Contact: Graham Software Co. USA
Phone (303) 422-0757
E-mail: blg@indra.com

Teach Me to Talk by Soft Touch Software
Many students have difficulties learning to speak or verbally expressing themselves clearly. This program features several strategies where children learn language through rhyme, rhythm, and repetition.
Availability: Commercial product

Phone: (877) 763-8868
Fax: (661) 396-8760
E-mail: softtouch@funsoftware.com

The Tomatis Method
This web site provides help for people with ADD, ADHD, learning delays, Autism, dyslexia, balance and coordination problems, sensory integration and motor skills difficulties, Asperger's Syndrome, Pervasive Development Disorder, and Down's Syndrome.
URL: http://www.tomatis.com/

Write: OutLoud by Don Johnston Inc.
This program is a flexible and user-friendly talking word processor that offers multisensory learning and positive reinforcement for writers of all ages and ability levels.
Availability: Commercial product
Contact: Don Johnston Inc. USA
Phone: (847) 526-2682
Fax: (847) 526-4177
E-mail: info@donjohnston.com

Zoom Caps by Meeting the Challenge Inc.
Designed for low light environments and vision impaired users, these stick-on keyboard labels feature large print alphabetic and numeric characters.
Availability: Commercial product
Contact: Meeting the Challenge Inc. USA
Phone: (719) 444-0252
E-mail: information@mtc-inc.com

Additional Resources

There are thousands of resources available to help you accommodate students with disabilities so they can actively participate in the *Safe Outdoor Learning Environment* activities as well as other activities in the classroom. Below is a list for teachers of students with disabilities.

Adelman, Howard and Linda Taylor. *An Introduction to Learning Disabilities*. Glenview, IL: Scott, Foresman, and Co., 1986.

American Printing House for the Blind. (1989). *Instructional aids, tools, and supplies for people who are visually handicapped*. Louisville, KY: American Printing House for the Blind.

Baca, L.M., & Almanza, E. (1991). *Language Minority Students with Disabilities*. Reston, VA: Council for Exceptional Children.

Bakken, J.P., Mastropieri, M.A., & Scruggs, T.E. (1997). Reading comprehension of expository science material and students with learning disabilities: A comparison of strategies. *Journal of Special Education*, 31, 300-324.

Carnine, D., & Kameenui, E. (1992). *Higher order thinking: Designing curriculum for mainstreamed students*. Austin, TX: PRO-ED.

Committee on the Prevention of Reading Difficulties in Young Children. (1998). *Preventing Reading Difficulties in Young Children*. (National Research Council Report). Washington, DC: National Academy Press.

Deschler, D.D., Ellis, E.S., & Lentz, B.K. (1996). *Teaching adolescents with learning disabilities: Strategies and methods*. (2nd ed.). Denver: Love Publishing.

Elliott, S.N., Kratochwill, T., & Schulte, A.A.G. (1998a). *The assessment accommodation checklist*. Monterey, CA: CTB/McGraw-Hill.

Fountas, I.C., & Pinnell, G.S. (1996). *Guided reading: Good first teaching for all children*. Portsmouth, NH: Heinemann.

Garbarino, J., Brookhouser, P.E., & Authier, K.J. (Eds.). (1987). *Special children special risks: The maltreatment of children with disabilities*. Hawthorn, NY: Aldinede Gruyter.

Jenkins, J.R., & Jenkins, L.M. (1981). *Cross age and peer tutoring: Help for children with learning problems*. Reston, VA: Council for Exceptional Children.

Kame'enui, E.J., Carnine, D.W., & Dixon, R.C. (1998). Effective teaching strategies that accommodate diverse learners. In E.J. Kame'enui & D.W. Carnine (Eds.), *Effective teaching strategies that accommodate diverse learners* (pp. 1-17). Columbus, OH: Merrill.

Lerner, Janet. *Learning Disabilities: theories, diagnosis, and teaching strategies*. 6th ed. Boston, MA: Houghton Mifflin Co., 1993.

Mastropieri, M.A. (1997). Guidelines for adapting science activities for including students with disabilities. In G.P. Stefanich, E.C. Bergan, and J.C. Paulsen, (Eds.). *What others are doing: Proceedings of a working conference on science for persons with disabilities* (pp. 5-23). Cedar Falls, IA: University of Northern Iowa.

O'Connor, R.E., & Jenkins, J.R. (1996). Cooperative learning as an inclusion strategy: A closer look. *Exceptionality*, 6, 29-51.

Pangrazi, R.P., & Dauer, V.P. (1995). *Dynamic physical education for elementary school children*. Boston: Allyn & Bacon.

Raynes, M., Snell, M., & Sailor, W. (1991). A fresh look at categorical programs for children with special needs. *Phi Delta Kappan*, 73, 326-331.

Scruggs, T.E., & Mastropieri, M.A. (1994d). Successful mainstreaming in elementary science classes: A qualitative investigation of three reputational cases. *American Educational Research Journal*, 31, 785-811.

Taymans, J.M., & DeFur, S. (1994). Preservice and inservice development for school to adult life transition. *Career Development for Exceptional Children*, 17, 171-186.

U.S. Department of Education (1998). *To assure the free appropriate public education of all children with disabilities: Twentieth annual report to Congress on the implementation of the Individuals with Disabilities Act*.

Wiesgerber, R.A. (1993). *Science success for students with disabilities*. Reading, MA: Addison-Wesley.

Westman, Jack C. *Handbook for Learning Disabilities: a multisystem approach*. Boston: Allyn & Bacon, 1989.

Yager, R.E. (1983). *The importance of terminology in teaching K-12 science*. Journal of Research in Science Teaching, 20, 577-578.

Zirpoli, T.J., & Melloy, K.J. (1997). *Behavior management: Applications for teachers and parents* (2nd ed.). Upper Saddle River, NJ: Merrill/Prentice Hall.