

## **Tips for Leading Science and Everyday Experiences with Children and Families**

- Be flexible, energetic, and positive.
- Be prepared. Assemble all of your materials before your class and practice conducting any hands-on activities.
- Arrive early to allow yourself time to set up, and leave time at the end of the class to clean up.
- Be sure you have volunteers to assist you with hands-on and computer activities.
- Divide children into groups by grade level. Based on how children grow and develop, the best grouping for classes is grades K-3, grades 4-5, grades 6-8, and grades 9-12.
- Consider each participant's skill level and learning style when designing your activity.
- Repeat activities and build on previous activities to reinforce what you are teaching the participants.
- Provide opportunities for the participants to work together in groups of two or more, as well as to work independently.
- Actively involve the participants in hands-on experiments and inquiry-based computer activities.
- Allow every student the opportunity to experiment, to write, and to apply his or her knowledge to everyday life.
- Actively model behaviors that you want your students to follow and practice.
- Recognize and explore cultural differences.
- Use language and resources that are non-sexist, non-racist, and non-stereotypical.
- Connect your lessons to different types of science and mathematics careers.
- Make safety a priority!
- Use a variety of assessment techniques to evaluate participant achievement such as student-generated reports, pictorials, or observing students performing a hands-on task.
- Ask questions, encourage the participants to ask questions, and allow time for writing about the experiences and for reflection and discussion.
- Maintain high standards and high expectations for all participants.
- Talk to parents about the importance of being involved in their children's education.

**Table 1**  
**Thinking and Learning Characteristics of Young People**

*Source: Sharing Science with Children: A Survival Guide for Scientists and Engineers,*  
 North Carolina Museum of Life and Science, Durham, NC.

Early Elementary (K-2)	Late Elementary (3-5)	Middle Grades (6-8)
<p><b>As a thinker...</b></p> <ul style="list-style-type: none"> <li>• Learns through manipulating objects.</li> <li>• Believes what he or she sees.</li> <li>• Can't trace steps back from a conclusion.</li> <li>• Sees parts, not the whole.</li> <li>• Does not understand that making physical changes in an object does not change its amount.</li> </ul>	<p><b>As a thinker...</b></p> <ul style="list-style-type: none"> <li>• Although still somewhat tied to seeing in order to believe, begins to understand concepts as well as objects.</li> <li>• Understands hierarchical classification systems.</li> <li>• Can combine, sort, multiply, substitute, divide.</li> <li>• Begins to generalize, formulate hypotheses, and use systematic problem-solving strategies.</li> <li>• Likes to memorize and to learn facts.</li> </ul>	<p><b>As a thinker...</b></p> <ul style="list-style-type: none"> <li>• Can hypothesize, create propositions, and evaluate.</li> <li>• Can conceptualize in the abstract and understand probability.</li> <li>• Begins to understand multiple causation.</li> <li>• Developing an understanding of ethical principles.</li> </ul>
<p><b>As a learner...</b></p> <ul style="list-style-type: none"> <li>• Is expansive, adventurous, curious, eager to learn, energetic, always in motion, loud, and emotional — has mood swings.</li> <li>• Wants to please adults.</li> <li>• Has difficulty controlling impulses and regulating behavior.</li> <li>• Is very “me” centered. Seeks attention. Loves praise.</li> <li>• Likes to work in groups, but will need assistance.</li> <li>• Can sit still and listen 10-15 minutes; needs frequent change of pace.</li> </ul>	<p><b>As a learner...</b></p> <ul style="list-style-type: none"> <li>• Likes group activities and excursions. Is a great socializer and eager to fit in</li> <li>• Understands rules and can follow them.</li> <li>• Considers fairness to be important.</li> <li>• Takes initiative and is self motivated.</li> <li>• Is becoming an independent learner.</li> <li>• Is a perfectionist who will practice the same thing over and over again.</li> <li>• Can sit still and listen 20-30 minutes (variety increases attention span).</li> </ul>	<p><b>As a learner...</b></p> <ul style="list-style-type: none"> <li>• Is emotional, restive, and eager to get moving.</li> <li>• Is easily bored.</li> <li>• Challenges rules, routines, and authority.</li> <li>• Is typically more oriented to small group activities.</li> <li>• Has a vulnerable ego and is very self-conscious and concerned about how he/she is perceived by others.</li> <li>• Can handle 30-40 minute sessions.</li> </ul>

## **A Baker's Dozen: Effective Instructional Strategies**

The instructional strategies outlined in this chapter reflect recommendations contained in *Everybody's Children: Diverse Teaching Strategies*, produced by the Association for Supervision and Curriculum Development (ASCD). A complete copy of Chapter 3 "Baker's Dozen: Effective Instructional Strategies" is attached for additional reading.

### **Strategy 1: Provide Opportunities to Work Together**

With the teacher's help, students learn to work in a variety of flexible social configurations and settings—in cooperative learning groups, in pairs, and alone—thus developing proficiencies, skills, and knowledge while at the same time accommodating individual differences in strengths, background and interests.

### **Strategy 2: Use Reality-Based Learning Approaches**

Teachers provide young people with real purposes and real audiences for reading, writing, speaking, and presenting mathematical and scientific hypotheses or calculations. When students write and speak to intended purposes and audiences, they are more likely to be motivated and to obtain valuable feedback on their efforts.

### **Strategy 3: Encourage Interdisciplinary Teaching**

Thematic, interdisciplinary teaching helps students connect what they learn from one subject to another, to discover relationships, and, in Thoreau's metaphor of the ideal, to see in every pebble a universe.

### **Strategy 4: Involve Students Actively**

Teachers give every student ample opportunities to experiment actively and directly with oral and printed language, to write, and to apply mathematics to the experiences of daily life.

### **Strategy 5: Analyze Students' Learning/Reading Styles**

Teachers consider students' individual learning preferences in designing and recommending complementary instructional methods and materials.

### **Strategy 6: Actively Model Behaviors**

Teachers model behaviors they would have their students assimilate and practice.

**Strategy 7: Explore the Fullest Dimensions of Thought**

Teachers provide all students with meaningful opportunities to develop and apply the fullest dimensions of thinking, helping them become critical thinkers and creative problem solvers while engaging them in their own learning.

**Strategy 8: Use a Multicultural Teaching Approach**

Teachers recognize and explore multicultural perspectives in all areas of curriculum, emphasizing through example and instruction the strength and value of a unified society forged from cultural diversity.

**Strategy 9: Use Alternative Assessments**

Because they recognize and understand its multiple roles, teachers demonstrate positive attitudes toward assessment and use various modes to evaluate student achievement and behavior, as well as all other aspects of learning and teaching.

**Strategy 10: Promote Home/School Partnerships**

Through well-planned, comprehensive, long-lasting programs, parents are involved in a variety of meaningful school roles, including decision making and participating in activities as well as in the educational development of their children.

**Strategy 11: Use Accelerated Learning Techniques**

Teachers recognize and base instruction on the fact that accelerated learning techniques can be effective with students at every level of ability and performance.

**Strategy 12: Foster Strategies in Questioning**

To engage students in more active learning and response, teachers encourage them to generate their own questions and lead their own discussions.

**Strategy 13: Emphasize Brain-Compatible Instruction**

Teachers develop programs and techniques that build on the full and complex functional capabilities of the human brain.

## **Diverse Teaching Strategies for Diverse Learners**

The following list, taken from *Educating Everybody's Children: Diverse Teaching Strategies*, outlines a multitude of teaching strategies shown by research to be effective in educating diverse student learners. Diverse student learners include students from racially, ethnically, culturally, and linguistically diverse families and communities of lower socioeconomic status. The complete article from the Association for Supervision and Curriculum Development is attached for additional reading.

### **Strategies for Culturally and Ethnically Diverse Students**

#### **Strategy 1: Maintain High Standards and Expectations**

Teachers maintain high standards and demonstrate high achievement expectations for all ethnically, culturally, and linguistically diverse students; this includes offering challenging and advanced coursework.

#### **Strategy 2: Incorporate the Home Culture**

Teachers learn about their students' home-community culture in order to better comprehend students' behavior in and out of the classroom.

#### **Strategy 3: Encourage Active Participation of Parents or Guardians**

Teachers inform parents of the importance of talking with their children, taking the time to read to them (in their home language), sharing oral histories and traditional folktales, and labeling objects and events around the home

#### **Strategy 4: Capitalize on Students' Backgrounds**

Teachers recognize that learning is strongly influenced by students' cultural backgrounds. Although students differ in their knowledge of oral and written language, research demonstrates that all children come to school with a background of experience that teachers can capitalize on during the learning process.

#### **Strategy 5: Use Culturally Relevant Curriculum Materials**

Teachers use culturally relevant curriculum and instructional materials that recognize, incorporate, and accurately reflect students' racial heritage, and the contributions of various ethnic groups.

#### **Strategy 6: Identify and Dispel Stereotypes**

Teachers use language and instructional resources that are nonsexist, nonracist, and nonethnocentric; if stereotypes are present in lectures or texts, teachers point them out to students.

#### **Strategy 7: Create Culturally Compatible Learning Environments**

Teachers recognize the influence of students' learning styles, culture, and native language on the ways in which they learn and use language.

**Strategy 8: Use Cooperative Learning**

Teachers use cooperative learning approaches that increase the likelihood of interethnic friendships and improved attitudes and behaviors toward classmates of different backgrounds. Methods that include group goals and individual accountability are the most effective.

**Strategy 9: Capitalize on Students' Culture, Language, and Experiences**

Teachers construct lessons in ways consistent with students' home-community culture and language to take advantage of students' cognitive experiences and to allow students opportunities to engage in behaviors conducive to achievement.

**Table 7**  
**Teaching Strategies & Behaviors for Working with Learning Disabled Students**

<b>Visual Impairments</b>	<b>Hearing Impairments</b>	<b>Physical Impairments</b>	<b>Behavior Disturbances</b>
<ul style="list-style-type: none"> <li>• Encourage the student to use other senses. (Touch objects, smell and taste when safe, and listen for sound.)</li> <li>• Draw the students attentions to shapes, weights, sizes, temperature, and textures.</li> <li>• Describe colors or patterns he or she cannot understand.</li> <li>• Be sure area is well lit. White butcher paper on tables and solid colored materials and containers are easier to see.</li> </ul>	<ul style="list-style-type: none"> <li>• Use visual aids, especially when explaining safety procedures.</li> <li>• Talk at a normal speed and volume at a distance that is best for the student to hear.</li> <li>• Talk with the student and ask questions to check for understanding.</li> </ul>	<ul style="list-style-type: none"> <li>• Touch-sensitive students are often wary of handling new or highly sensory materials. Describe the texture. Offer gradual exposure by encouraging the student to touch the object quickly or gently, working up to prolonged exposure.</li> <li>• Help the child find a position that allows for the greatest movement, such as on the floor or on a cushion, sitting in a wheelchair, or secured to a chair.</li> <li>• As needed, rearrange materials or equipment.</li> <li>• Take into consideration mobility impairment when asking students to draw something.</li> </ul>	<ul style="list-style-type: none"> <li>• Students with aggressive behavior find it difficult to work in small groups and therefore need plenty of materials to choose from and plenty of space to work in.</li> <li>• Children who react withdrawn need to observe activity before trying it on their own. Look for comfortable ways for them to interact with others, such as filling containers with water for a group experiment.</li> <li>• Students who are hyperactive do best with short activities so they can feel a sense of closure before trying something new.</li> <li>• Watch for signs of restlessness and take steps before the child loses control.</li> </ul>

Source: Adapted from *Learning Through Play: A Practical Guide for Teaching Young Children*, Scholastic, Inc., 1991.