
Super Science Connections

Integrated Activities for Grades K–3

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Disclaimer. This publication is intended for use by teachers or other adults with properly supervised children. All adults and children are expected to follow normal safety precautions when performing the activities described in this manual (see A Note about Safety). Neither the authors nor the publisher assumes liability for the use of information in this publication.

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ICE Publication 94-009

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Preface

The Institute for Chemical Education (ICE) has a major publications program to accompany its many workshops for pre-college teachers. This book, intended for K–3 teachers, has arisen naturally out of planning for workshops we call *Super Science Connections*. These workshops provide materials and training to help K–3 teachers incorporate science and science activities as an integral part of their curricula.

The *Super Science Connections* (SSC) program has resulted from efforts of a variety of individuals. Ronald Perkins, Assistant Director of ICE, had been interested for some time in creating a new program that would allow early elementary teachers to make effective use of the many activities that had been developed in ICE workshops for high school and middle school teachers and published by ICE in *Fun with Chemistry: A Guidebook of K–12 Activities, Volumes 1 and 2*, compiled and edited by Mickey and Jerry Sarquis. In 1991 Janice Smith applied to become an ICE Fellow to develop science materials that would be integrated with reading and math for early elementary grades. Her interest clearly matched Ron Perkins' idea, and she was appointed an ICE Fellow for the summer of 1992.

In order to have a program that would be easily incorporated into K–3 classrooms, we needed input from K–3 teachers who really know what will and will not work. ICE was very fortunate to be able to put together an SSC Board consisting of award-winning teachers whose enthusiasm for science was boundless and who were willing to work on this project without full compensation for their efforts. Celeste Bunting, Carol Colegate, Patricia McKean, Karen Perkins, and Linda Pils came to UW–Madison in July 1992 to meet with Ron Perkins, Janice Smith, Natasha Aristov, Glen Dirreen, and me. That meeting began a process of hard work and long hours for everyone concerned that has culminated in SSC workshops held at Sacred Heart University and UW–Madison, as well as this publication. Janice has detailed the contributions everyone has made to this publication in her introduction on page xvi, and so I will not repeat them here. Suffice it to say that a great deal of effort has gone into this publication and the accompanying workshop program.

I think I can speak for everyone involved when I say that the results have been well worth the effort. I hope that you, the reader, will agree. I also hope that you will pass along any suggestions you may have for ways that we could improve this program. You are invited to correspond with me at the address on the back cover.

John W. Moore, Director

June 1995

About Super Science Connections

Super Science Connections: Integrated Activities for Grades K-3 (SSC) was designed to help elementary school teachers who have little science background integrate hands-on science activities into a typical K-3 curriculum. It was written by K-3 teachers, for K-3 teachers.

SSC integrates children's literature, writing, mathematics, art projects, social studies, and health instruction with hands-on science—observing, devising experiments, hypothesizing, and drawing conclusions. It models ways in which your classroom can become a place where students learn and enjoy science in context. SSC contains 39 activities centered on a science concept or process skill connected to the AAAS *Benchmarks for Science Literacy*. The activities are divided into these topics:

Color and Light
Insulation
Pressure
Surface Tension
Water and Changing Its State



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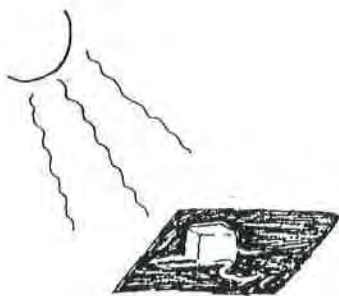
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updated 2/2012



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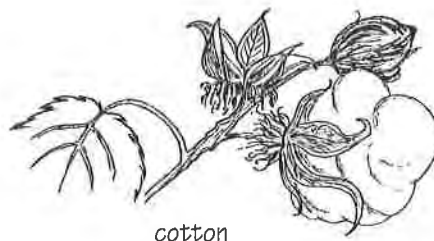
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A Note about Safety

The measure of appropriate safety precautions is what would a reasonable person have done in the situation. We have taken a cautious, conservative view of “reasonableness” in the activities in SSC. We have included only those chemicals and procedures that we do in our own classrooms with confidence that we are not risking the safety of any of the students. The proper safety action if something is splashed into the eye is to wash the eye out with water for five or ten minutes. We are not recommending safety glasses for all of the activities, unless local policies require it. While one of the experiments uses vinegar, no family requires its children to wear safety glasses while using Italian salad dressing! We have not included reactions with ammonia at this age level, however, because a reasonable person would not have a child of this age using ammonia.

There are two activities where we suggest eye protections. One is “Seltzer Surprise” where the top of a film canister pops off, and there is a chance that the top could hit a student directly in the eye, if the student did not follow the directions to stand back. Try this experiment yourself to get an idea of the force of the reaction. The other experiment where we suggest eye protection is “Fabulous Fancy Fabric”. This is because we are using plastic pipets that are similar to medicine droppers containing rubbing alcohol. These pipets are a great way to deliver small quantities of liquid to one spot. They can also be used as squirt guns, either accidentally or because one of your students just couldn’t resist the temptation!

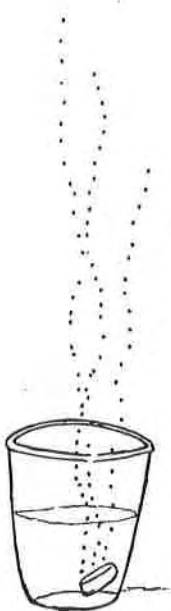
You will want to check with your local school district about specific regulations. Some require safety glasses for any science work. There are usually two justifications of this. One is that the district is responding to any potential liability by exercising extreme caution. The other is that wearing safety glasses is a way to model behavior that highlights that safety is an important consideration in a laboratory situation. That is, it doesn’t matter what chemicals are being used, the goal is to reinforce that safety glasses should be worn in a science laboratory.

There are many sources of both safety glasses and safety goggles including Safety Glasses USA.com (www.safetyglassesusa.com), Enviro Safety Products (www.enviro-safetyproducts.com), Educational Innovations (www.teachersource.com), Delta (www.deltaeducation.com), and Science Bob Store (www.sciencebobstore.com).

Publications that are good references for safety at the elementary school level include:

- “Exploring Safely: A Guide for Elementary Teachers” by Terry Kwan and Juliana Texley; NSTA; available in print, as an e-book, or bundled (both print and e-book)
- “Safety in the Elementary (K–6) Science Classroom” 2nd edition, American Chemical Society; PDF available online at http://portal.acs.org/portal/fileFetch/C/WPCP_O12300/pdf/WPCP_O12300.pdf
- “Science and Safety: It’s Elementary”, Council of State Science Supervisors; information is in the form of a calendar/poster; available online at http://www.csss-science.org/downloads/scisaf_cal.pdf
- “Safety in the Elementary Science Classroom”, NSTA; a flipchart/poster; available from NSTA or from amazon.com

updated 2/2012



Introduction

Super Science Connections integrates hands-on science activities with other curricular areas, particularly the language arts. It is written for teachers of children in grades K–3. It encourages the kind of classroom where the teacher isn't sure how many hours in a day or week are spent on science, because the science is integrated and flows naturally with the other events throughout the day. The activities include science background information, science process skills, classroom management suggestions, extensions of the original activity, and connections to other relevant areas.

If this SSC publication meets its objectives, you will use it to begin wherever you are in your attitude and commitment to hands-on science in your elementary classroom and move in the direction of

- > doing more science,
- > emphasizing process skills as well as science content,
- > including physical science as well as the life sciences, and
- > connecting in context to other curriculum areas.

Super Science Connections activities are designed to help children develop science literacy as described in *Benchmarks for Science Literacy*. This book is a compilation of specific science literacy goals by grade level from the American Association of the Advancement of Science. The book emphasizes that "...when the benchmarks specify that 'Students should be able to do...' something, we take that to mean they will in fact do so when appropriate circumstances present themselves." (*Benchmarks*, 1993, p 28). That is, to be scientifically literate, students must learn both content knowledge and process skills. In addition, both the content and the process must be learned in context so that connections can be made appropriately. We have correlated the activities in SSC to the specific benchmarks in *Benchmarks for Science Literacy*. General benchmarks that relate to the nature of

science and science process skills are available in *Benchmarks for Science Literacy, Project 2061*. American Association for the Advancement of Science. 1993 and 2009. Available at

www.project2061.org/publications/bsl/online/index.php?home=true

Specific science content benchmarks are included at the start of each lesson.

In *Super Science Connections*, children do science. We quote Jeff G. Brodie, a fifth and sixth grade teacher at East Side Elementary in Edinburgh, IN

Vocational education has always understood that if you want someone to learn to repair an automobile, you need an automobile to repair. If you want to teach someone to cook, you put them in a kitchen. Whoever heard of teaching someone to swim in a traditional classroom? Likewise, I do believe that we are learning that in order to truly teach science, we must 'do' science. (Haury and Killero, 1992)

Celeste Bunting, a first grade teacher and SSC Board member, writes

A hands-on approach to science in the classroom is the best way for students to learn. It is also one of the best ways to get children to love science and pursue further study in this area. Children who learn by doing and by being given the chance to actually experience the how and why behind a scientific principle will make it become a part of them. William James said 'People can alter their lives by altering their attitudes', and if we can alter our students' attitudes about learning science, they will begin to think of themselves as scientists as they explore the world around them.

For example, throughout the year, the teacher assigns one student at a time to bring in a mystery object in a bag and to write five clues about it. (A student page for this example follows this introduction.) The class responds by predicting what the object inside might be, using the five clues to draw a picture of what they think is in the bag. A poem that you might want to integrate with this activity is "What's in the Sack" from *Where the Sidewalk Ends* by Shel Silverstein.

See page xvii.

As another specific example, develop a collection of buttons or buy some from Cuisenaire Company. Read *The Button Box* by Margarette S. Reid. Have students work in groups of four. Two of the students in the group choose a rule to use to classify the buttons and then divide the buttons into piles based on the rule. They do not tell the other two students what rule was used. Now the other two students work together to determine what rule was used to classify the buttons. This activity is easily adapted to the ability of the children depending on the number of criteria in the rule (color, size, number of holes, flat or rounded, etc.). Follow the discussion by writing about or drawing pictures of these buttons. (A student page for this example follows this introduction.)

See page xix.

See page xxi.

A third activity that emphasizes a science process skill is “Classifying Cards” in the Introduction, where students use a microviewer (×30 magnification) to identify a substance. (The complete unit, including student page, follows this introduction.)

These three activities will help to meet the following objectives of Benchmarks for Science Literacy [available online at

<http://www.project2061.org/publications/bsl/online/index.php?home=true>]

- **Physical Setting, Section D The Structure of Matter K–2:** By the end of the 2nd grade, students should know that:

Objects can be described in terms of their properties. Some properties such as hardness and flexibility, depend upon what material the object is made of, and some properties, such as size and shape, do not. **4D/P1***

- **Habits of Mind, Section D Communication Skills K–2:** By the end of the 2nd grade, students should be able to:

Describe and compare real-world objects in terms of number, shape, texture, size, weight, color, and motion. **12D/P1***

Draw pictures that portray some features of the thing being described. **12D/P2***

What if I don't have time or money?

Those of us involved with the *Super Science Connections* project are aware that teachers new to teaching science in a hands-on integrated way may feel that they do not have enough time, enough science background, or enough money. You can do the activities in this book with a little time, as much science background as you have, and with very little money!

The *Super Science Connections* Board members are classroom teachers themselves and understand that you do not have the time to spend an hour each morning preparing for an activity, an hour the night before gathering the materials, and an hour reorganizing and cleaning afterwards. As one of the participants in Carol Colegate's workshop wrote “these are teachers who really teach in the real world and know what we face everyday.” The activities are easy to prepare, and use readily available materials. No treasure hunts; you don't need to know your local chemist—or even your high school science teachers! (A local science person can be a great resource, however.)

Little money is the reality in many school districts. For example, a first grade teacher in rural Pennsylvania told me that her school “had less than \$50 to improve the science center K–6th grade this year.” At a workshop in Connecticut I suggested a weekly letter home to the parents, and one of the teachers

said that she would never be allowed to use so much paper! We are therefore acutely and painfully aware of the need to keep SSC materials at a cost that is minimal. No elementary science happens if the teacher is limited to just reading the catalog and wishing that he/she could buy the stuff! It is part of the mission of ICE to make quality materials for teaching of science available at low cost, and the activities in this book are faithful to that mission.

What if I don't know much about science?

Elementary teachers often perceive themselves as “not knowing enough” about the subject matter. This is particularly true of the physical sciences. We have provided science background information for you with the activities. Nevertheless, it is OK not to know the answer to a student’s question! Actually, you can be an important role model illustrating how scientists experiment and explore to find out the answer to a question. All you have to say is “I don’t know. How can we find out about this?” That is about the best definition of research that there is! SSC Board member Karen Perkins writes

Once the teacher has become convinced that he/she doesn’t have to know ALL the answers and can learn along with the children, teaching science in the primary grades can be an exciting and rewarding experience.

Science background information is included with each activity. It provides the teacher with background and is NOT intended to be science content taught to the student. Some of the activities have science content that is developmentally appropriate for grades K-3. Others are interesting and motivating activities that teach about being a scientist. As Laura Huber (an elementary school teacher and science coordinator who reviewed this book) writes, “Science education should be about teaching the kids how to be a scientist first and about science content second.”

In judging what is appropriate science content for the elementary grades, *Super Science Connections* supports the view that “the ‘what’ of science is as interesting as the ‘why’” (Gabel, 1989). Elementary science should provide a variety of concrete, hands-on experiences; focus on things from nature that can be observed; and emphasize the science process skills. Science taught in this way will build a basis of experiences and thinking skills that can be used with older children to begin to answer the ‘why’ questions.

As you begin to develop your own science units that connect with other curricular areas, I recommend the following:

- NSTA in cooperation with Children’s Book Council publishes annually “Outstanding Science Trade Books for Students K–12”. Lists for current and previous years are available at <http://www.nsta.org/publications/ostb/>
- “CCBC Choices” is created annually by the librarians of the Cooperative Children’s Book Center (a library of the School of Education, University of Wisconsin–Madison) and published by the Friends of the CCBC, Inc. CCBC is a book examination center and research library that receives and reviews copies of almost all trade and alternative press books published in English in the U.S. for children and young adults. Ordering information may be found at <http://www.education.wisc.edu/ccbc/books/choices.asp>

I would also encourage you to share what you have learned about the effectiveness of this kind of teaching and learning with other teachers. Pat McKean, an elementary science teacher and mentor as well as an SSC Board member) shares this definition of teaching: “a series of decisions that are made to increase the learning of a child.” My efforts will be well rewarded if this publication helps you to make those decisions and, therefore, increase the learning of the children in your classroom.

Send me your comments and reactions and ideas. Perhaps there will be a *Super Science Connections III*

Janice E. Smith

NOTE: Some of the information in this Introduction has been updated in 2012. Updates appear in a darker font.

References

Benchmarks for Science Literacy, Project 2061. American Association for the Advancement of Science. 1993 and 2009. Available at <http://www.project2061.org/publications/bsl/online/index.php?home=true>

Gabel, Dorothy L. “Let Us Go Back to Nature Study.” *Journal of Chemical Education*. 1989, 66 (9), pp 727–729.

Haury, David L. and Rillero, Peter. “Hands-on Approaches to Science Teaching, Questions and Answers from the Field and Research”. ERIC Clearinghouse for Science, Mathematics, and Environmental Education, #ED349185. Ohio State University. 1992. full text at <http://www.eric.ed.gov/PDFS/ED349185.pdf>

Reid, Margarette S. *The Button Box*. Dutton Children’s Books. 1990. ISBN #0-525-44590-0

Silverstein, Shel, “What’s in the Sack” from *Where the Sidewalk Ends*. Harper Collins Childrens Books. 1974. ISBN #0-06-025667-2.

Credits

Celeste Bunting, Carol Colegate, Karen Perkins, and Pat McKean have served on the ICE K-3 Advisory Board since it began in the summer of 1992. They are really the authors of this book in the sense that I put their expertise on paper.

*John Moore, the director of ICE, has made it possible for us to collaborate as teachers and scientists, to meet and plan the *Super Science Connections* project, and to write these activities. Ron Perkins, the assistant director at ICE, helped to shape the vision.*

Cynthia Dawes Smith in York, PA provided the art work. She says she learned science as she read the units and sometimes just had to stop drawing and actually do the activity to see what happened!

Margie Zimmerman joined us in the summer of 1994 and added the curriculum development expertise.

Laura Huber (an elementary school science coordinator and graduate student in Curriculum and Instruction) reviewed the draft for appropriateness of science content and concepts to the grade levels (K-3) of our audience, and I have incorporated many of her suggestions into this improved version.

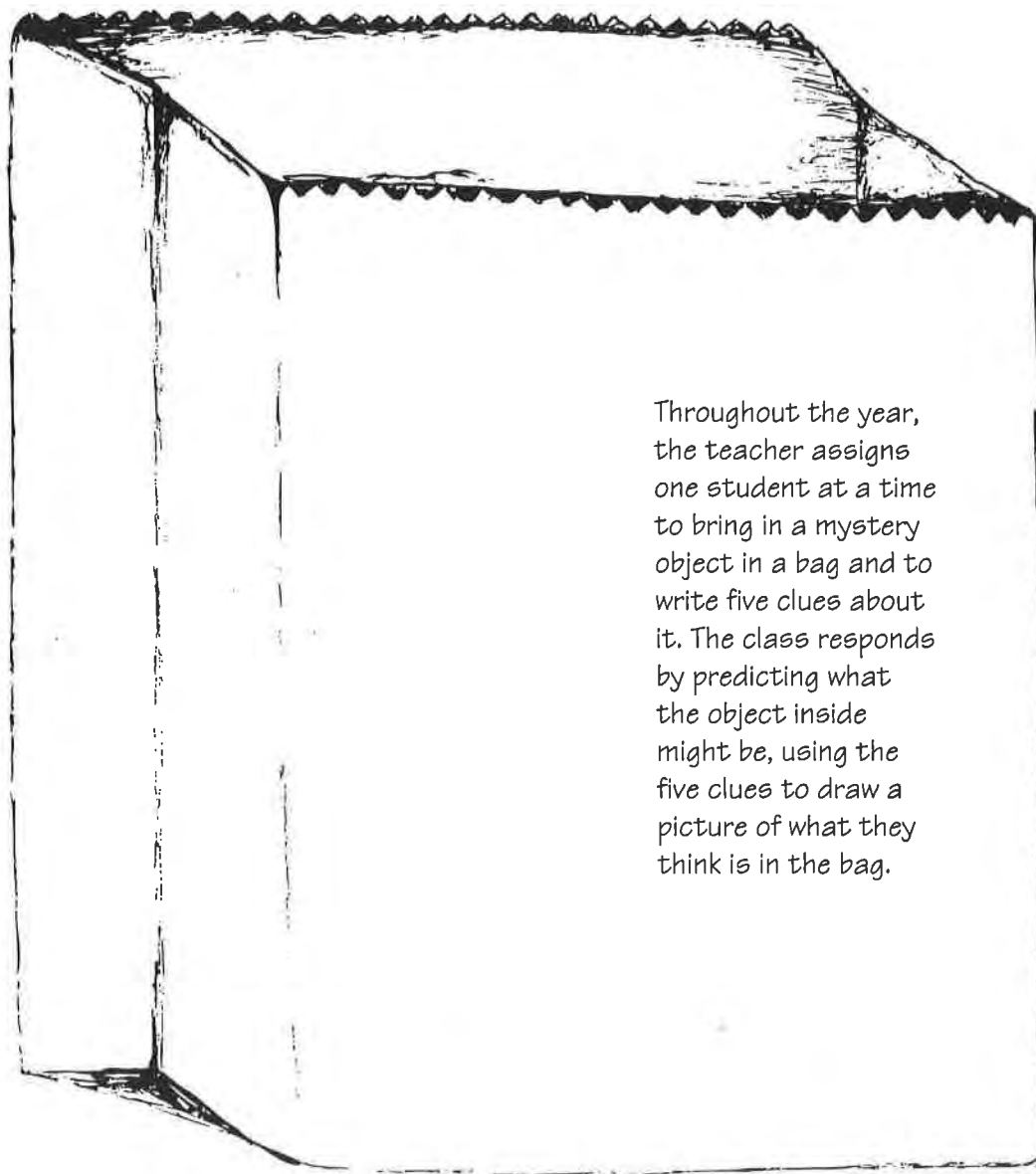
Jeanne Hamers reviewed the draft for scientific accuracy and clarity of explanations of the science concepts. She also checked the directions for carrying out each activity. I have incorporated many of her suggestions into this final draft.

Betty Moore at ICE headquarters in Madison put all the pieces together—the art, the text, and the graphic style. It is amazing what can happen to a text file in her expert hands!

The following persons participated in the reviewing or development of this book or portions of it and I appreciate the expertise that each of them shared: Linda Pils, Rosemarie Kaminski Rung, Lynn Toft, Kim Sterner, Marie Dunstan. Gregory Fuchs did the computer drawings and also scanned, enhanced, translated, distilled, and generally kept track of all of the artist's sketches with the result that they appear to have been drawn on the printed page. Bill Tallon participated in the field testing of the first draft of the book.

Finally, thanks to my family, Greg, Jennifer, and Jeremy, who have made their summer vacations whatever they could do within driving distance of Madison while I worked on this project.

What's in the Bag?



Throughout the year, the teacher assigns one student at a time to bring in a mystery object in a bag and to write five clues about it. The class responds by predicting what the object inside might be, using the five clues to draw a picture of what they think is in the bag.

Directions to students and parents:

- ___ 1. Put your name on the bag. Place a small common object inside this bag. Fold down the top of the bag.
- ___ 2. On the form below, write or draw 3 to 5 descriptive clues about the object. Use as many of your senses as you can.
- ___ 3. Bring the bag with the completed form to school the next morning.

*BE SURE TO KEEP THE OBJECT A **SECRET!**
Do NOT tell even your best friend!*

At school we will try to guess what is inside the bag.

The object will be returned to you.

My name is: _____

Clues:

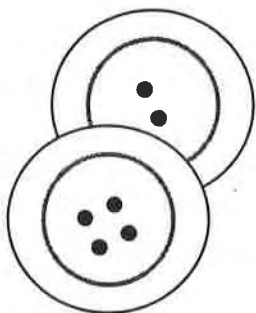
1. _____

2. _____

3. _____

4. _____

5. _____

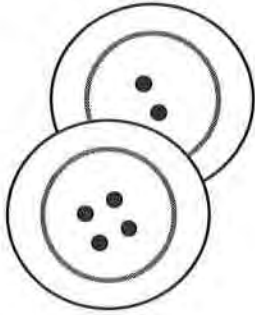


Buttons

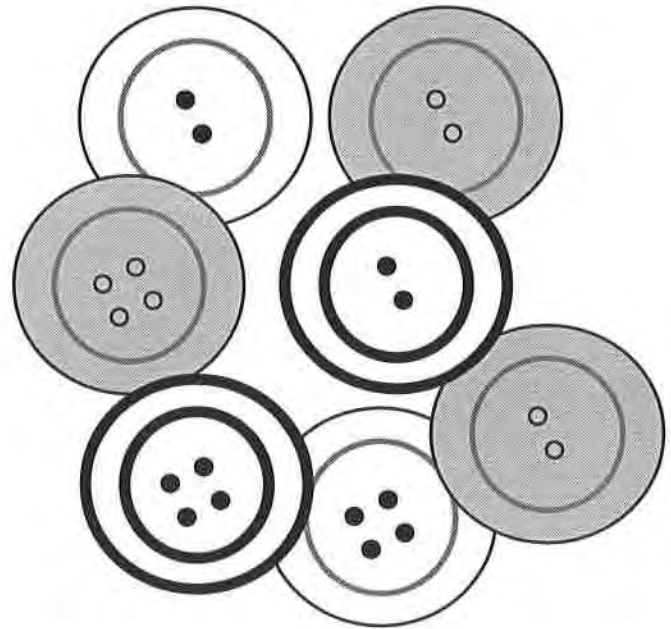
Directions to students and parents:

Develop a collection of buttons or buy some from Cuisenaire Company. Read *The Button Box* by Margarette S. Reid. Have students work in groups of four. Two of the students in the group choose a rule to use to classify the buttons and then divide the buttons into piles based on the rule. They do not tell the other two students what rule was used. Now the other two students work together to determine what rule was used to classify the buttons. This activity is easily adapted to the ability of the children depending on the number of criteria in the rule (color, size, number of holes, flat or rounded, etc.). Follow the discussion by writing about or drawing pictures of these buttons.

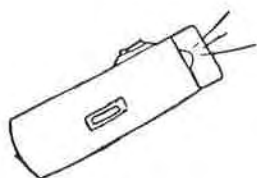
For younger students, make attribute cards for color, size, shape, texture, etc. Have one child select one of the attribute cards and then select the buttons that fit the attribute. The other children try to guess what attribute card was used. Attribute cards can be by word or by picture, depending on reading abilities.



Things we know about the group of buttons:



Names of the scientists: _____



Classifying Cards

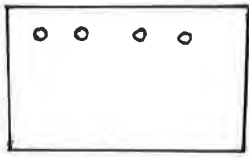
Can you identify the crystal?

Materials ✓ List	I NEED for my class:	I HAVE:
Microviewer* or pocket microscope	_____ Microviewers	_____
"slide" or guide card of each substance (and classifying cards for students to identify)		
index card, 5 in. x 8 in. (13 cm x 20 cm.)	_____ index cards	_____
clear tape	_____ clear tape	_____
hole punch	_____ hole punch	_____
black construction paper	_____ sheets of black paper	_____
shaker containers of		
salt	_____ salt shaker	_____
sugar	_____ sugar shaker	_____
flour	_____ flour shaker	_____
borax	_____ borax shaker	_____
sand	_____ sand shaker	_____
Epsom salts	_____ Epsom salts	_____

*Available from: American Science & Surplus, Catalog # 23137, Delta, Catalog # 53-130-3280, or Edmund Scientific, Catalog # B35, 001.

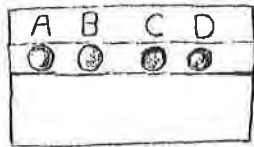
- SAFETY FIRST: Epsom salts and borax can cause illness if ingested. Emphasize to your students that materials used in activities should NOT be tasted. While tasting the sugar or salt won't harm them, they could easily mistake the harmful materials for those that can be eaten.

Directions for Making the Slides

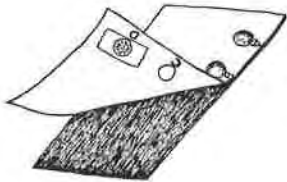


___ 1. Punch 3 or 4 holes in the 5 x 8 index card. Space them so that you can write the name of the substance next to the hole.

___ 2. Put clear tape on the back of one of the holes in the card. Sprinkle salt on the sticky side of the tape that is exposed through the hole in the card. Put another piece of tape on top of the hole in the card. Label as salt.



___ 3. Repeat with the other holes, replacing the salt with the other substances that are listed in the materials. There are six substances listed for you to choose three or four to put on the guide card. For this age level, we recommend no more than four substances.



___ 4. Tape or glue the card to a sheet of black construction paper.

___ 5. Punch 3 or 4 holes in each of the 5 x 8 index cards. Repeat step 2, but do not label the substance on the card. Instead, label as A, B, C, D. Make several of these and number as Card 1, 2, 3, etc.

Directions for Using the Slides and Microviewers



___ 1. The Microviewers require 2 size AA batteries. There is an off/on switch for the light and a knob that is used to focus. They magnify 30x.

___ 2. View each of the substances on the 5 x 8 card that is labeled. Put the microviewer directly on the object.

___ 3. Take one of the numbered classifying cards. View it. What substance is labeled A? Which one is B? etc.

Discussion

What are the shapes you see?

How are the substances different from each other?

Connection

Read *Two Bad Ants* by Chris Van Allsburg.

References

The idea for classifying cards is from Carol Colegate and Karen Perkins, Personal communication.

Van Allsburg, Chris. *Two Bad Ants*. Houghton Mifflin. 1988. ISBN #0-395-48668-8

A looks like: _____

B looks like: _____

C looks like: _____

D looks like: _____

Names of the scientists: _____

A looks like: _____

B looks like: _____

C looks like: _____

D looks like: _____

Names of the scientists: _____