Southwest Consortium for the Improvement of Mathematics and Science Teaching

Classroom Compass

Fall 1994 • Volume 1, Number 2

HIGHLIGHTS

Models That Promote Cooperative Learning
PAGE 3

Estimation: Building Mathematical Power
PAGE 4

Pumpkin Exploration: An Elementary Activity
PAGE 5

Choosing a Company Site: A High School Mathematics Activity
PAGE 6

Statistics: A Reflection of Our World
PAGE 7

Resources for the Cooperative Classroom
PAGE 10

Cooperative Learning

Cooperative learning has been a popular topic in educational circles for more than a decade. Researchers and practitioners have found that students working in small cooperative groups can develop the type of intellectual exchange that fosters creative thinking and productive problem-solving. This issue of Classroom Compass *will look at some aspects of cooperative learning and ways it can be implemented in your classroom.*

How It Works

The large oak tree outside the high school campus shades a stone picnic table. It is a favorite spot for students to gather and talk about dating, sports, TV, and, sometimes, homework and upcoming exams. Informal study groups meet there to discuss particularly troublesome aspects of algebra or chemistry. You can tell intellectual work is occurring: the concentration is evident, the seriousness is real. These groups exchange questions and explanations that are rich and intense.

Informally, such small group interaction is common. Students have always gathered together to practice and study. But there is a growing acknowledgment that combined with whole group instruction and individual work, cooperative learning should be a regular part of the week's classroom instruction.

Student interaction makes cooperative learning powerful. To accomplish their group's task, students must exchange ideas, make plans, and propose solutions. Thinking through an idea and presenting it in a way that can be understood by others is intellectual work and will promote intellectual growth. The exchange of alternative ideas and viewpoints enhances that growth and stimulates broader thinking. It is the teacher's job to encourage such exchanges and structure the students' work so their communication is on-task and productive.

continued on page 2

Reading List for Cooperative Learning

Andrini, Beth. *Cooperative Learning & Mathematics: A Multi-Structural Approach.* San Juan Capistrano, CA: Kagan Cooperative Learning, 1991.

Aronson, Elliot., et al. *The Jigsaw Classroom.* Beverly Hills, CA: Sage, 1978.

Artzt, Alice F., and Claire M. Newman. *How to Use Cooperative Learning in the Mathematics Class.* Reston, VA: National Council of Teachers of Mathematics, 1990.

Cohen, Elizabeth G. *Designing Groupwork.* 2d ed. New York: Teachers College Press, 1994.

Hassard, Jack. *Science Experiences: Cooperative Learning and the Teaching of Science.* Menlo Park, CA: Addison-Wesley, 1990.

______. *Minds on Science: Middle and Secondary School Methods.* New York: HarperCollins, 1992.

Johnson, David W., and Roger T. Johnson and Edythe Johnson Holubec. *Cooperation in the Classroom.* Rev. ed. Edina, MN: Interaction Book Company, 1991.

______. *The New Circles of Learning: Cooperation in the Classroom and School.* Alexandria, VA: Association for Supervision and Curriculum Development, 1994.

Sharan, Shlomo, and Shachar, Hana. *Language and Learning in the Cooperative Classroom.* New York: Springer-Verlag, 1988.

Slavin, Robert E. *Cooperative Learning: Theory, Research, and Practice.* Englewood Cliffs, NJ: Prentice-Hall, 1990.

Cooperative Learning, *continued*

In addition to intellectual growth, cooperative learning enhances students' social and personal development. Group members can learn to work together in classrooms that reflect the complexity and diversity of the world. Students' lives are full of interactions with friends, family members and strangers and their futures will find them in jobs that require cooperation. The skills that are essential for productive group work in the classroom are relevant for today and the future.

What It Looks Like

There are many ways to talk about cooperative learning. While some teachers use informal one-on-one study groups to bolster skills, other more formal structures include designated student roles and specific steps for completing long-term assignments. There is no one "right way" to develop cooperative learning, and teachers must choose models and methods that match their particular teaching styles, students, and lesson content. The ways the teacher sets up the learning groups and designs the assignments will determine in part what the students experience.

Studies of students in cooperative learning groups indicate that two elements enhance student achievement. One is *group goals*. Group members should be interdependent, working to accomplish a common product. Relying on the skills of one group member or allowing one or two to dominate the activity does not result in greater understanding for all.

Closely linked to group goals is the second element of *individual accountability*. Assignments should be structured so each member accomplishes a specific task. Try to provide opportunities for every group member to make a unique contribution. Student groups that work together without differentiated tasks (for example, to prepare a single worksheet) have not shown significant achievement benefits.

Provide the groups a space where they can work together. Students should be able to sit in a circle or across the table from each other and work without disruption. The teacher can act as a consultant, turning problems back to the group for resolution and providing feedback on how well they are working together.

Working Together

Productive groups in the classroom rarely happen spontaneously; simply placing students together and giving them an assignment is not enough. While students may choose friends for private study groups, it is a different matter to accommodate group members in a classroom and complete a project. Students new to cooperative learning may find it difficult to focus on the assignment. Many students have been taught in an independent, competitive atmosphere. Those experiences can not be immediately transformed to produce a cooperative group member, eager to share and work with colleagues.

Introducing students to interpersonal skills is the first step to getting the groups to work together. Making eye contact, encouraging fellow group members, using quiet voices, disagreeing without hostility—these habits will become part of the cooperative group's repertoire, but the students will need practice. Frequent monitoring and reinforcement is essential to assure that learning is actually occurring in the groups. Establish some rules for group behavior that promote equal exchanges. For example:

- Contribute your ideas—they may be the key to the question
- Listen to others' ideas
- Give everyone a chance to speak
- Ask all teammates for help before asking the teacher
- Use consensus to settle disputes

A mix of different abilities, ethnic backgrounds, learning styles, and personal interests works best for productive student teams. One of the benefits of cooperative teams is the mixing of students who have not interacted before. Rather than allowing students to choose their own partners, assign students to teams.

Mathematics and Science Cooperation

The National Council of Teachers of Mathematics (NCTM) recommends that students be provided opportunities to work together cooperatively in large and small groups on significant problems—problems that arise out of their experiences and frames of reference. Group assignments should help learners combine new knowledge with prior knowledge, leading to the construction of new ideas within the group. Students should question, discuss, make mistakes, listen to the ideas of others, provide constructive criticism and summarize discoveries.

For example, students might be given equations to solve that include the use of parentheses. Groups of students would work together to arrive at best solutions to the problems and then share their solutions and strategies with the whole class. Discrepancies among solutions would stimulate small group analysis of the procedures used and lead to ideas about rules for governing this situation. During the group process, the teacher can provide assistance when it is needed—conferring with the group about their solutions, posing questions to keep the group on track, and providing encouragement as the group progresses through the task. Groups would then report their findings and hypotheses to the whole class, explaining their use of parentheses to solve the problems.

Laboratory science is a perfect setting for cooperative learning. The science lab has long been the place students could become active participants. Use these lab periods to encourage the interdependence and cross-student support of cooperative learning. Try structuring the lessons so each team member has an assigned task or question to research and then have group members compile the results in order to complete the overall task.

Younger science students can work cooperatively, too. Studies have provided evidence that cooperative methods are particularly effective in grades 2–9. Fewer studies have examined grades 10–12. The earlier and more often students participate in cooperative groups, the more comfortable and skillful they become in them. All team members can share leadership responsibilities.

The individual teacher's style and the characteristics of a particular class will influence the way cooperative learning works. Don't be discouraged if your efforts don't achieve the desired results immediately. It takes time for new methods to evolve, and it is very difficult to do it alone. Find at least one other colleague who is interested in cooperative learning and find out more about the ways to use cooperative groups together. Attend some professional development activities that will broaden your understanding of how to use small groups effectively. With the support and help of fellow teachers and other colleagues, you will see the benefits of cooperative learning in your classroom.

Models That Promote Cooperative Learning

Many teachers find that initial efforts to set up cooperative learning groups run into a variety of problems that range from student resistance to inappropriate assignments. It may help to try a model that can provide organization and guidance. The models listed here are only a few of many. You will quickly see ways to adapt them or develop new models that match the unique requirements of your classroom.

In the **Jigsaw** model the student becomes a member of both a learning group and a research team. After determining the learning group's goal, the members join research teams to learn about a particular piece of the learning puzzle. Each puzzle piece must be solved to form a complete picture. Research can take many forms. The teacher may want to prepare "expert sheets" that outline readings and questions to obtain the information needed. Or the students can use their own strategies to glean information through library research, interviewing experts, or experimentation. Upon completion of the expert teams' work, the members return to their original learning groups and share the results. Class discussion, a question-and-answer session, or a graphic or dramatic production will allow the groups to share their findings with the class at large. (Originally presented by Aronson and colleagues, 1978.)

Another model, **Group Investigation**, is more student-directed in its approach. After the teacher presents an introduction to the unit, the students discuss what they have learned and outline possible topics for further examination. From this list of student-generated topics, each learning group chooses one and determines subtopics for each group member or team. Each student or group of students is responsible for researching his or her individual piece and preparing a brief report to bring back to the group. The group then designs a presentation (discourage a strict lecture format) and shares its findings with the entire class. Allow time for discussion at the end of the presentation. A class evaluation for each presentation can be an effective way of providing feedback to the groups. (Sharan & Shachar, 1988)

Numerous simple models enhance questioning, discussion, and class presentations by structuring the activity in a cooperative format. **Numbered Heads Together** is a way of reviewing information that has been previously presented through direct instruction or text. This model works well with unambiguous questions that allow students to come to consensus. Divide the students into groups of 4 and have them number off from 1 to 4. After the teacher asks the question, the groups huddle to determine the answer. The teacher calls a number and the students with that number respond.The teacher then has the others agree or disagree with a thumbs up or thumbs down. (Andrini, 1991)

To encourage responses from all students, try **Think-Pair-Share**. Students pair with a partner to share their responses to a question. Students are then invited to share their responses with the whole class. There are a variety of ways to share, including Stand Up and Share—everyone stands up and as each student responds he or she sits down. Anyone with a similar response also sits down. Continue until everyone is seated. Or do a "quick whip" through the class in which students respond quickly one right after another.(Andrini, 1991)

ESTIMATION: BUILDING MATHEMATICAL POWER

This synthesis is based on "Estimation for Grades K–4" from *Curriculum and Evaluation Standards for School Mathematics* by the National Council for Teachers of Mathematics. Order from NCTM, 1900 Association Drive, Reston, VA 22091, 1-800-235-7566.

Children enter school with estimation skills. Jill knows she is "about 6," Daniel is "a little shorter" than his sister, and the entire class knows when it is "almost" playtime. This is knowledge based on experience and it provides a foundation for learning to estimate quantities.

Good estimating skills introduce students to another dimension of mathematics. Terms such as *about, near, closer to, between, almost*, and *a little less than* illustrate that mathematics is more than exactness or computation. Estimation interacts with number sense and spatial sense to help children understand concepts and procedures. It encourages flexibility in working with numbers and measurements and gives the student a way to check for reasonable results.

It is important to learn a variety of estimation methods. For example, a student who needs to know the value of 243 + 479 might estimate by thinking, "200 and 400 is 600, 43 and 79 is more than 100, so the sum is a little more than 700." This is "front-end estimation." Another way of estimating is: "243 is just under 250, 479 is just under 500, so the sum is less than 750." This flexible use of rounding provides numbers that are easy to work with. Someone adept at mental computation could estimate 243 + 479 in another way: "24 (tens) + 48 (tens) is 72 (tens) so the sum is about 720." Discuss various strategies and help students develop their own methods for solution.

Young children can estimate large numbers—the number of blades of grass in the yard, the number of candies in a jar—or small numbers. Shown a cluster of ten dots, have students quickly estimate several other clusters of dots as *more than ten, fewer than ten, about ten.* Talk about "good" estimates—how close to the exact number must an estimate be, and emphasize that for some situations the exact answer is no better than the estimate.

Estimation is especially important when children use calculators. Rough estimates will give them enough information to decide whether the correct keys were pressed and whether the calculator result is reasonable. Such uses of estimation reduce the incidence of errors with calculators, decrease the inappropriate use of calculators for simple computation, and contribute to children's development of number sense, operation sense, and mathematical power.

In later grades, mathematical instruction should concentrate on a variety of problem-solving methods. It is not necessary to spend large portions of instructional time on routine computations by hand, and students must learn to choose between mental calculations, paper-and-pencil computation, or use of calculators and computers. Estimation should be a part of the students' repertoire of skills, to be used as a problem-solving method as well as a way of checking the reasonableness of results.

This activity gathers the students into cooperative groups to observe, predict, gather data, set up a record of their findings and discuss the difference between estimation and exact totals.

Allowing the students to determine which characteristics they will examine gives them responsibility for the activity and an ownership in its outcome.

As the groups begin their task, the teacher acts as a facilitator, helping them start their examinations and encouraging participation by every group member.

Each member is responsible for a question, but some of the questions are more complicated than others: measuring the pumpkins' circumferences and translating them to inches will take more time than listing their colors. To complete the data sheet, group members will need to negotiate and distribute the work.

As well as accomplishing academic tasks, cooperative groups promote the social skills necessary for successfully working together. Listening to each other, assisting one another, sharing, and disagreeing in a positive way are all skills that are required for productive group work. Praise group members who are exhibiting those skills.

Monitor the groups' interactions, but give them time to work out problems that may occur. If the teacher tries to immediately step in and resolve conflicts, the students will not build the skills needed for future activities.

Pumpkin Exploration: An Elementary Activity

	Pumpkin 1	Pumpkin 2	Pumpkin 3
1. How tall?			
2. How big around?			
3. What color?			
4. What is the weight?			
5. How many lines on the outside?			
1st Seed Count (Prediction)			
2nd Seed Count (Estimation)			
3rd Seed Count (Exact Total)			

Pumpkins are fun! Their size and color, smell and taste make them perfect for children's observation and exploration. In this activity students in cooperative groups search, suggest, question, predict, and estimate the number of seeds in a set of pumpkins. They will combine mathematical procedures and scientific observation to learn more about this seasonal delight.

Divide the students into groups of 5 that reflect the diverse abilities of your classroom. Each group will examine 3 pumpkins and record their observations on a chart (see sample). A local farmer or grocery store may be willing to donate pumpkins for this activity.

Brainstorming

To introduce the activity, have the whole class discuss what the pumpkins look like from the outside and what they might look like on the inside. Talk about roasting and eating pumpkin seeds as snacks. If they were going into the grocery store and looking for a pumpkin with many seeds, how would they know which one to choose? The mission: determine what characteristics, if any, would help predict the number of seeds within. Let the students discuss the characteristics of the pumpkins and the various ways they could measure and describe them. Some examples might be: How tall? How big around? What about the color, the shape? What is the weight? Does the number of outside grooves tell anything? What about the smoothness of the pumpkin's skin?

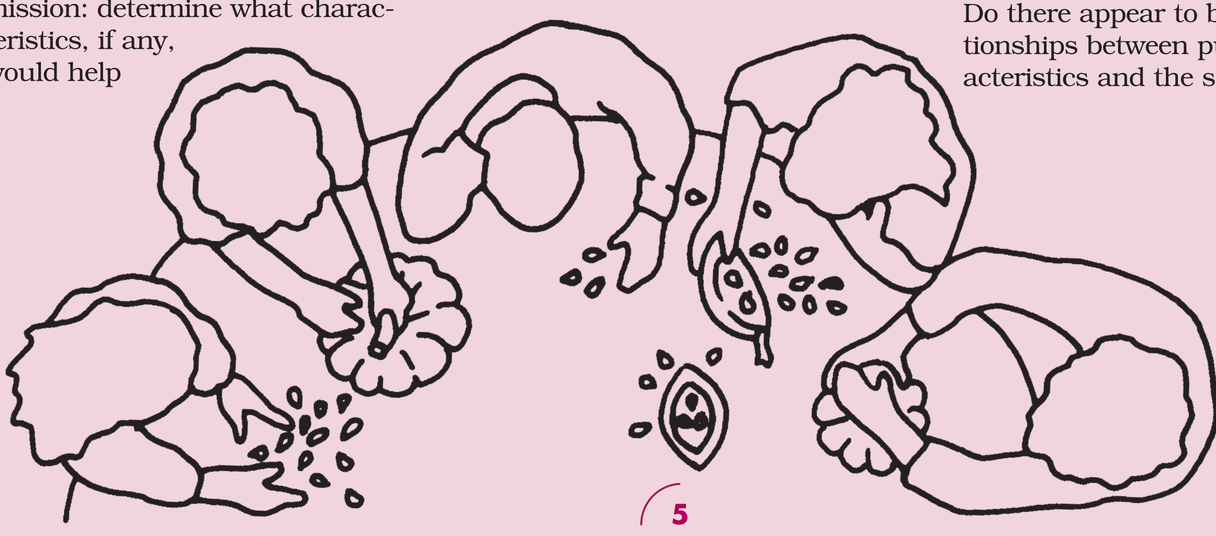
Data Gathering

Individual groups will decide on 5 questions to investigate; each group member is responsible for 1 question. If the group decides to measure the pumpkins, the students can use string to make the measurements, plot the string lengths on a meterstick or yardstick, and translate the findings to the group's chart.

Prediction and Estimation

When data collection is completed and recorded, each group will predict the number of seeds in the pumpkin and discuss possible connections between the number of seeds and the pumpkins' characteristics. Cut the pumpkins open, scoop out the seeds and pulp, separate the seeds and pulp and let the seeds dry. Each group should estimate each pumpkin's seed total, then count the seeds for an exact total.

Post all the groups' charts and compare the exact number of pumpkin seeds with the predictions and estimations. How different are the totals? Do you need an exact total to plan a snack? What about a farmer who will harvest the seeds of pumpkins in a field? Do pumpkins with similar characteristics have similar seed counts? Do there appear to be any relationships between pumpkin characteristics and the seed counts?



Choosing a Company Site: A High School Mathematics Activity

Make the connection between mathematics and the working world in this scenario tied to your community. Students in working groups gather information from printed and local sources and get a glimpse of the cooperation required when businesses grapple with important choices.

The Scenario

A local company wants to build a new facility. It has narrowed its possibilities to five cities but it will require some additional data to make its final decision. The company needs a prediction of the conditions at the chosen site in the year 2010, based on trends from the 1970, 1980, and 1990 censuses. The board of directors will receive recommendations and determine the final selection.

Introduction

An introductory class discussion can focus on several questions: How is the census information gathered? Do the numbers represent samples or exact counts? Who categorizes the responses? How are the data interpreted and presented?

Brainstorming

The class will determine what factors a company must consider when choosing a new location. Topics might include per capita income, educational levels in the proposed area, water use, tax base, and available recreational facilities. Move the discussion to local industries and finally examine one that can be the focus of the class activity. The list of topics will depend on the industry chosen. A lumber company, for example, would look for a different type community than would a high tech firm. Help the class determine what characteristics are important and have them list 5–10 topics they will examine. They will also need to choose 5 possible sites for the relocation.

Advisory and Data Groups

Each student will work in 2 different groups. First, the Site Advisory Group, a team of 5 or 6 students, is responsible for making a site recommendation. The Site Advisory Group members will join different Data Groups, which will focus on a particular topic (e. g., a Water Group, a Tax Base Group) and gather information for the five locations. At the conclusion of the data gathering phase, the Site Advisory Group members reconvene and examine the data. It is up to each Site Advisory Group to interpret the data, compare characteristics, choose a site and present its findings. Try to enlist community members, perhaps from the industry in question, to serve as the reviewing board of directors.

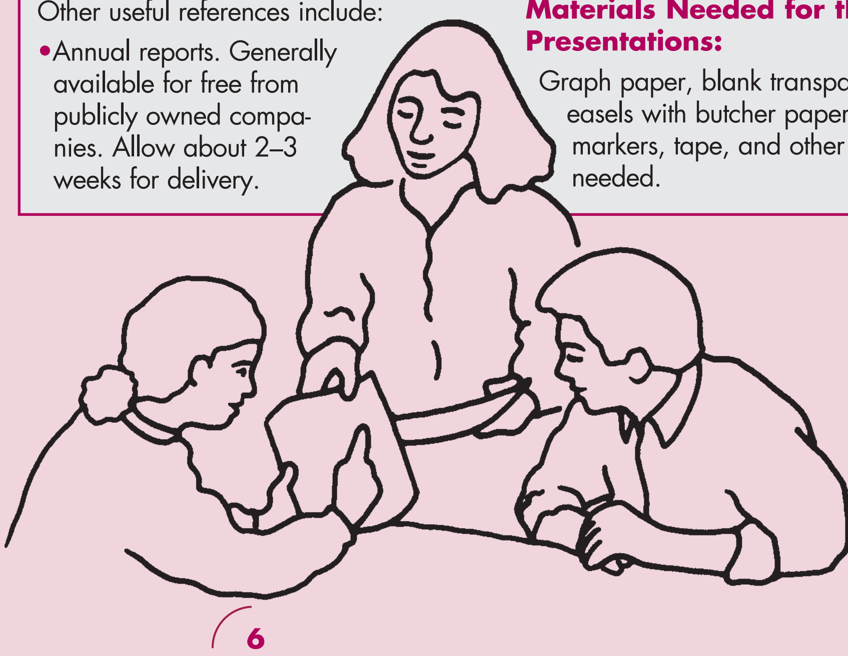
Resources Needed:

The census is a fruitful source of mathematics activities for older students. It is a sophisticated estimation based on limited data and students should understand its strengths and limitations. Coordinate this activity with the school librarian or community library resources. One of the most useful resources is the *Statistical Abstract of the United States*, a one-volume condensation of census data that is in most school or community libraries. Other useful references include:

- Annual reports. Generally available for free from publicly owned companies. Allow about 2–3 weeks for delivery.
- Other publications of the Bureau of the Census. Detailed information on most aspects of the census can be obtained in separate publications from the Government Printing Office. Ask your librarian.
- Magazines. *Money*, *Forbes* and other magazines rank locations by various factors. Encyclopedias and almanacs also have information on specific areas.

Materials Needed for the Presentations:

Graph paper, blank transparencies, easels with butcher paper pads, markers, tape, and other items as needed.



Statistics: A Reflection of Our World

This activity is set up in a Jigsaw structure—the student groups must break into research teams that examine one aspect of the problem, then return to their original groups to share their findings and put the entire "puzzle" together.

Successful work in the two groups will require negotiation, communication, reasoning, and cooperation. The students will need to discuss mathematical concepts and ensure that they gather relevant data. Every student must join an expert group and research a topic. Without each member's contribution, comparisons will be incomplete and the group will not be able to make a recommendation.

Each group should present its findings in a meaningful way and should be free to determine what methods—single speaker, written reports, visual presentations—to use.

The Advisory Groups should contain as broad a mix of students as possible so different interests and abilities can be shared. They will learn the importance of trusting team members and can call on the knowledge of the others. Together they create a larger and better picture of the site than they could alone.

By choosing an industry that is relevant to the community, the students can gather data from local sources. By enlisting community members to serve as the board of directors, you can emphasize the importance of mathematics to the work world.

This synthesis is based on "Statistics for Grades 9–12" from *Curriculum and Evaluation Standards for School Mathematics* by the National Council for Teachers of Mathematics. Order from NCTM, 1900 Association Drive, Reston, VA 22091, 1-800-235-7566.

Collecting, representing, and processing data are important activities in today's society. Through the media, in the natural and social sciences, in advertising claims and legal proceedings we are confronted with data that has been summarized, analyzed, and transformed. To function in the modern world, students should learn to apply such techniques as simulations, sampling, fitting curves, testing hypotheses and drawing conclusions. They will need such tools to solve problems and evaluate the statistical claims they encounter daily.

The study of statistics in grades 9–12 should build on understandings of data analysis methods begun in the elementary and middle grades. Students should learn the qualified nature of statistical analysis and the role statistics plays in straddling the exactness of mathematics and the subjective world of individual opinion. They should be encouraged to apply statistical tools to other academic subjects through student-opinion polls for social studies, word or letter counts for English, or plant-growth records for biology. Such out-of-school activities as athletics provide further opportunities for immediately relevant data analysis.

Computing technology allows quick and precise calculation and presentation of data. The study of statistics should add an understanding of the appropriateness of measures for a given problem and what such measures as mean, variance, and correlation can tell about a problem. Students must learn to interpret results intelligently. The notions of randomness, representativeness, and bias in sampling will enhance their ability to evaluate statistical claims. Students headed for college should also be able to apply their understanding of sampling in designing their own experiments to test hypotheses.

Students should be aware that bias can arise in the interpretation of results as well as in sampling: the interpreter's predisposition or expectation may strongly affect the message derived from the statistical results. Such bias often occurs in the presentation and interpretation of data gathered for political purposes and advertising.

College-bound students should be familiar with such distributions as the normal, Student's *t*, Poisson, and chi square. They should be able to determine when it is appropriate to use these distributions in statistical analysis (e.g. to obtain confidence intervals or to test hypotheses). Instruction should focus on the logic behind the process in addition to the test itself.

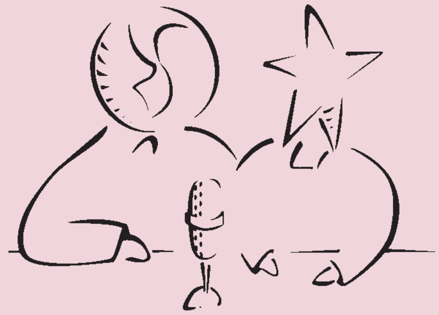
Statistical data, summaries, and inferences appear more frequently in the work and everyday lives of people than any other form of mathematical analysis. All high school graduates must acquire the capabilities identified in this standard. This expectation will require that statistics be given a more prominent position in the high school curriculum.

Opportunities

GIFT: Growth Initiatives for Teachers. A Grant Program for Mathematics and Science Teachers.

Offered by the GTE Foundation, the GIFT program supports excellence in the teaching of secondary science and mathematics and encourages the integration of these disciplines into school curricula. It also gives classroom teachers the opportunity to update their subject knowledge and undertake innovative projects. The grants are available in 32 states (including Arkansas, New Mexico, Oklahoma and Texas) and total $12,000 for the mathematics/science teaching team: $7,000 for a school enrichment project and $5000 ($2,500 for each team member) for professional development activities.

For further information about this grant program, call 1-800-523-5948.



Earth & Sky

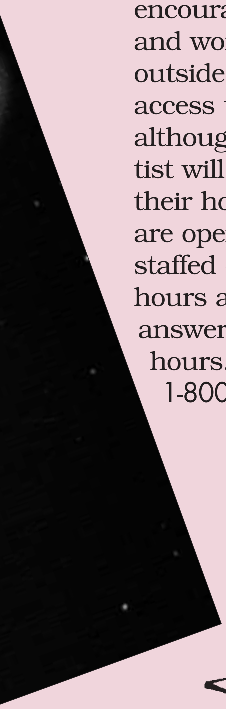
You may have heard the Earth & Sky programs on your radio: 2-minute interludes that focus on earth science and astronomy. The brief commentaries, aired over public and commercial stations, often provide an unexpected and welcome glimpse of the natural world in the midst of Top Forty music and dateline news. Earth & Sky sponsors a "Young Producers" contest that encourages students, grades 1–12, to produce their own 2-minute radio spots. Students research a question, write a script, and submit it on audiotape. The winning programs are played on Earth & Sky, which is broadcast all over the world via the Armed Forces Radio Network, as well as more than 500 stations in the U.S. The deadline for submission is May 15, 1995.

For further information contact:
Byrd & Block Communications
PO Box 2203
Austin, Texas 78768
512-477-4441

1-800-566-5066
A Service of The Texas Society for Biomedical Research
Texas Math & Science Hotline
(In Bexar County Call 1-210-567-1699)

Texas Math & Science Hotline

Got a question for a mathematician? Would your students benefit from contact with a practicing scientist? Try this telephone service sponsored by the Texas Society for Biomedical Research. The Hotline is building an impressive list of professionals from private practice, universities, industries, and government agencies who work in some area of mathematics or science. When questions come in from students or teachers, the request is referred to an appropriate source. The Hotline tries to link questioners with someone from their local area to encourage visits to classrooms and workplaces. Callers from outside the state can also access this handy number, although the responding scientist will probably not be from their hometown. Phone lines are open 24 hours a day, staffed during normal working hours and connected to an answering machine after hours. The number is 1-800-566-5066.



What is the Southwest Consortium?

The Southwest Consortium for the Improvement of Mathematics and Science Teaching (SCIMAST) is one of ten Eisenhower Mathematics and Science Regional Consortia established by the U.S. Department of Education. SCIMAST supports systemic reform through a variety of activities and services: by offering and supporting professional development, by helping states develop a vision of mathematics and science education, and by encouraging the use of appropriate instructional materials, methods, and assessments that support educational reform.

SCIMAST was funded in the fall of 1992 through a 3-year grant, grant number R168R20003-94, from the U.S. Department of Education's Eisenhower National Program for Mathematics and Science Education. Third year funds for SCIMAST total $1,348,100, representing 75 percent of the project's cost. An additional $499,367 is provided from nonfederal sources, making up 25 percent of project costs. SCIMAST is operated by the Southwest Educational Development Laboratory (SEDL) as part of the Center for the Improvement of Teaching in Mathematics and Science (CITMAS).

Eisenhower Southwest Consortium for the Improvement of Mathematics and Science Teaching

CITMAS Staff:

Wesley A. Hoover, director
Glenda Clark, senior training associate
Marilyn Fowler, senior training associate
Farley Halverson, senior training associate
Marilyn Irving, senior training associate
Gary Ketterling, senior training associate
Jackie Palmer, senior training associate
Barbara Salyer, senior training associate
Maria Torres, senior training associate
Jack Lumbley, evaluation associate
Mary Jo Powell, technical writing associate
Sharon Adams, information specialist
Lori Snider, administrative assistant
Veronica Lopez, administrative secretary
Dawn McArdle, administrative secretary

Classroom Compass is a publication of the Southwest Consortium for the Improvement of Mathematics and Science Teaching (SCIMAST) project, sponsored by the U.S. Dept. of Education under Grant Number R168R20003-94. The content herein does not necessarily reflect the views of the department or any other agency of the U.S. government. The *Classroom Compass* is distributed free of charge to public and private schools of Arkansas, Louisiana, New Mexico, Oklahoma, and Texas to support improved teaching of mathematics and science. The SCIMAST project is located in the Southwest Educational Development Laboratory (SEDL) at 211 East Seventh Street, Austin, Texas 78701; (512)476-6861/800-201-7435. Associate Editors: Sharon Adams and Mary Jo Powell with assistance from the Editorial Committee, Glenda Clark and Marilyn Irving. Special thanks to Gary Ketterling for the Pumpkin Exploration Activity and the rest of the CITMAS staff for their help.

Publication design by Jane Thurmond, Tree Studio

Resources for the Cooperative Classroom

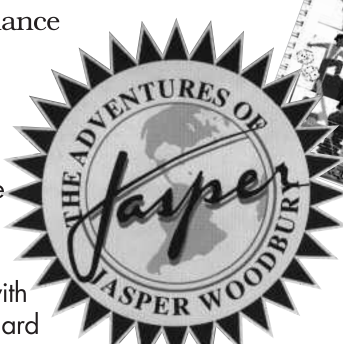
The Adventures of Jasper Woodbury

Combining cooperative groups and mathematical problem solving, this videodisc program for middle school students was developed by the Learning Technology Center at Vanderbilt University. Each of the six episodes, presented on 3 videodiscs, begins with a short movie that sets up a problem and poses a challenge. Whether stuck, out of gas, in a motorboat on a darkening lake, or plotting the course for a 5-mile race, the kids and adults in these engaging scenarios present believable dilemmas to be solved with mathematical and analytic skill. Content areas include: the relationship between distance, rate and time (trip-planning episodes); the use of probability and statistics (developing business plans); the use of geometry (map reading). The problems are designed for small group exploration—they require planning, research, collaboration, and problem solving. An accompanying notebook includes reproducible lesson materials, teaching tips and additional activities to enhance problem solving.

Available from:
Optical Data Corporation
30 Technology Drive
Warren, NJ 07059
1-800-524-2481

Available for Mac with 4 MB of RAM and hard disk drive, running System 6.0.7 or later.

Cost: Six episode set $1,795; Individual discs (two episodes) $695



Get It Together: Math Problems for Groups, Grades 4–12

With over 100 mathematics problems, this collection is designed for use with cooperative groups. Each activity provides six clue cards, each of which gives a piece of information that will help solve the group problem. Interactive sharing from each cardholder is essential to find an answer. The book covers a variety of mathematical topics including numbers and operations, logic, geometry, probability, measurement and functions. Each topic area includes activities of varying difficulty, and a handy grid at the back of the book matches grade levels and topics with activities. The book also offers advice on using cooperative learning in the classroom.

Available from:
EQUALS Project
Lawrence Hall of Science
University of California
Berkeley, CA 94720
1-510-642-1823

Cost: $15.00

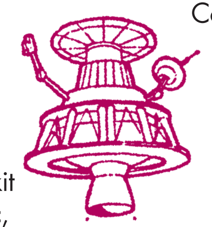
The Great Solar System Rescue

This astronomical adventure on videodisc launches students (grades 5–8) into the year 2210 on a quest for missing space probes lost in our solar system. Using clues from a variety of disciplines including geology, meteorology, history, and astronomy, cooperative teams locate the missing satellite and choose one of several suggested rescue strategies. A video library of stills and action clips about astronomical phenomenon accompanies the structured activities and greatly expands the possibilities for extended use. Clips range from a still representation of the mass of Jupiter to a computer simulation of a moonscape based on data sent back by the Voyager probe. The authors estimate the program can take from 4 to 12 class periods.

Available from:
Tom Snyder Productions
80 Coolidge Hill Road
Watertown, MA 02172-2817
1-800-342-0236

Available for Mac 3 1/2 (2 Megs, color) or Windows 3 1/2 (256 K)

Cost: $299.95 for kit includes 1 videodisc, teacher guide and student report booklets and blackline masters



Mars City Alpha

In this classroom simulation for grades 5–8, student teams design the first human habitat for Mars. The year is 2043 and the teams must study questions concerning biological life support, health and recreation, governance, geology and meteorology. The heart of the boxed kit is the student Mission Manuals, which provide detailed discussion of the various challenges confronting the designers. The kit's additional resources include color posters, activity booklets, and a glossy magazine-format manual on Mars. The teams come together after completing their individual assignments and the entire class designs the Martian city. The project can take from 4 to 9 weeks.

Contact:
Challenger Center for Space Science Education
1055 North Fairfax Street
Suite 100,
Alexandria, VA 22314
1-703-683-9740

Cost: $85.