SPECTRUM

THE JOURNAL OF THE ILLINOIS SCIENCE TEACHERS ASSOCIATION

FALL 1997

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Submissions, subscriptions, and inquiries regarding the journal should be sent to:

Diana Dummitt
ISTA Executive Secretary
University of Illinois
College of Education
1310 South Sixth St.
Champaign, IL 61820
(217) 244-0173 (217) 244-5437 FAX
e-mail: ddummitt@uiuc.edu

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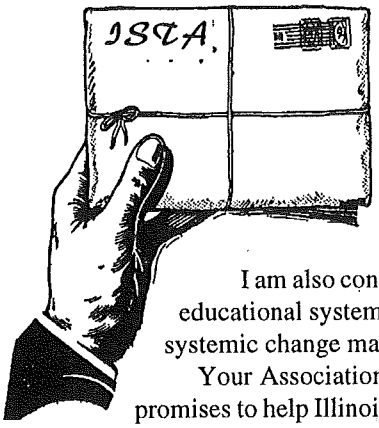
ISTA NEWS



FALL PRESIDENT'S LETTER

In the Summer issue I stated my conviction that it is time for teachers to take charge of their profession. We are in a period of furious educational change, and for too many teachers, reform is something done to them, not by them. I believe that teachers should initiate and lead improvement efforts. I have pledged the support of ISTA to Illinois teachers who propose educational changes that promise to increase student achievement in science.

I am also convinced that collaboration is essential to success. If we are to make lasting changes in our educational system, we must work with others whose goals and interests are similar to ours. The need for systemic change makes cooperation not only desirable, but necessary.

Your Association has launched several recent initiatives that act on these two principles. One initiative promises to help Illinois teachers teach the process of *technological design*, a science standard included among the Illinois Learning Standards that the Illinois State Board of Education adopted in July. *Technological design* describes the process by which humans design, build, test, and modify things that solve problems. At present, few Illinois teachers have curriculum, instruction and assessment models to inform them how to teach technological design to Illinois students.

In response to this situation, ISTA is helping teachers to help themselves. We joined with Illinois Association for Supervision and Curriculum Development (IASCD) and Illinois State University's CeMaST (Center for Mathematics, Science and Technology) to host a working conference in September for science teachers and administrators from across Illinois. Out of this conference will come opportunities for participants to identify and create resources for curriculum, instruction, assessment and professional development for their peers. CeMaST Co-Director Robert Fisher, a long-time ISTA member, led the conference. IASCD President Pete McFarlane has worked alongside me for the past year to make this project a reality. All three organizations made financial and in-kind commitments to the project, and all have a stake in the project's success.

This initiative illustrates one way that teachers can take leadership in Illinois to promote student achievement. The project also shows how teachers and administrators, working through their professional associations, can cooperate to achieve a goal that would be difficult or impossible to achieve alone.

In future columns, I will inform you about progress that we are making in these and other Association initiatives. Meanwhile, I challenge you to propose ways that you and your colleagues are willing to serve others in our state by leading change efforts. As I promised, ISTA will help you in your venture.

Doug Dirks

CALL FOR PAPERS
1998 ISTA CONVENTION
"PLUGGING INTO THE FUTURE"
CONVENTION CHAIR
LINDA O'CONNOR
SEE PAGE 6

Plan to Attend
ISTA
Science in the South
Conference
Southern Illinois University
at Carbondale
Student Center
Friday March 13, 1998
See page 7 for Information

Suzanne Asaturian
Carbondale Comm. H.S.
200 N. Springer Street
Carbondale, IL 62901
618-549-1686
sasaturian@jacksn.k12.il.us

NEWS FROM REGION 6

Hello from Southern Illinois!! I am enjoying representing region 6 for a second term. A committee of interested people from ISTA and Southern Illinois University have met and begun planning the Second Annual Science in the South ISTA meeting. It will be held March 13, 1997 at Southern Illinois University at Carbondale in the Student Center. You will find a call for papers in this issue of the Spectrum and also in the mail if you live in regions 5 and 6. Please share your great ideas at this southern conference. I hope you had as much fun as I did at the State Conference in Peoria!

Many other excellent opportunities are open for you to become involved in this year. Plan it Earth held several week long classes across the state to integrate Ecology into Science Curriculum and also to involve volunteers in the Riverwatch and Forest Watch. There are many opportunities to become involved in this important research with your students. ISTA will keep you posted in the Spectrum and also at the State and Regional conferences.

In Region 6, here at Southern Illinois University, there are several opportunities for you and your students to become involved in:

- Regional Science Fair, Carbondale — Tuesday, April 7, 1998
- Expanding Your Horizons, Carbondale — Saturday, November 15, 1997
- Jr. Science & Humanities Symposium, Carbondale — March 22-24, 1998

Best Wishes for a fun and educational year!! If you have any information to include in the Region 6 Report or in the Spectrum you can e-mail Dianna Dummitt or myself.

Georgiean Benson
Washington School
100 W. Jefferson
Monticello, IL
gbenson@net66.com

NEWS FROM REGION 4

As the recently appointed Region IV representative, please allow me an opportunity to introduce myself. For the past eleven years I have taught a self contained fifth grade class at Washington School in Monticello, IL. Previous to this I have taught junior high and high school biology classes and worked as a chemical research assistant. One of my hobbies is collecting fossils. I have been involved in my district's science curriculum, school improvement projects, and integration of technology into the curriculum. Presently I am involved with an ISBE sponsored curriculum based assessment project with K-12 teachers throughout the state.

Involvement in another ISBE pilot project, with 16 other Illinois teachers, on improving teaching standards has led to my completion of a portfolio and written assessment for National Board for Professional Teaching Standards. This is a highly rewarding, yet rigorous, process that demonstrates knowledge of content and the learning process. In December, 1996, I was notified that I had passed and was now certified as Middle Childhood Generalist, NBCT. ISBE sponsored about 16 more teachers during the last year, and is prepared to sponsor more teachers in this upcoming year. In December of 1997, the certification for teachers of adolescent (14-18 years old) students in science will first become available. For further information call NBPTS at 1-800-22TEACH, ISBE, or me. I look forward to working with teachers in this region. Thank you.

Karen Meyer
2103 - 5th Avenue
Rock Island, IL 61201
309-793-5914
MsKMeyer @aol.com

NEWS FROM REGION 2

Congratulations to Steve Chelstrom, newly elected Region 2 Director. He teaches sixth grade science and directs environmental education for 3rd, 6th, and 7th grades at Orion Middle School. He has been associated with ISTA for about 15 years and considers science of critical importance to education in general. Man has an ongoing dynamic relationship with science and responsible informed citizens are necessary to cope with change and technology as the world evolves.

At the summer planning meeting, several initiatives were approved. ISTA will continue involvement in teacher certification in Illinois, look at the content of TIMSS (http://wwwcsteep.bc.edu/timss) in relation to NAEP and IGAP test results, and develop grade level products to help define and assess technological design as it relates to the State Standards. If you would liketo be involved in some of these areas, please let us know. You can download standards from the isbe homepage (http://www.isbe.state.il.us).

Steve will work on the Finance Policy Committee and I will continue to work with the Certification Task Force, the Technological Design Task Force, and the Standards Dissemination Task Force.

Congratulations to Linda Taylor, Horace Mann Choice School in Rock Island, as a Presidential Award Winner for 1997. She is from Region 2 and was honored with 9 other elementary and 10 secondary exemplary science teachers at the Conference in Peoria October 2-4.

Region 2 will hold a meeting/conference at the Loredo-Taft Campus of NIU at Oregon, IL on Saturday November 8, 1997 (see below). Drs. Sonia and Robert Vogl will show us a prairie restoration project and speak on "Using Technology in Prairie Studies." Discussion is scheduled on how to relate Illinois Learning Standards to environmental education. New ISTA initiatives will be also be discussed. Help shape science education in Illinois — plan to be there!

Please feel free to contact me with science event dates or concerns at the above address.

Gwen Pollock
ISBE 100 N. First Street
Springfield, IL 62777-0001
(217)782-2826

DID YOU KNOW?

Well, it has been a little while since I have been able to chat with you through this avenue. Lots of excellent science for Illinois has been happening. First of all, congratulations to Betty Trummell, from Husmann Elementary School in Crystal Lake and Ron Williams from Schaumburg High School in Schaumburg. They are the 1996 Presidential Awards of Excellence Winners for Elementary and Secondary Science Teaching for Illinois. They went to Washington in June and represented us beautifully. We did not get word of their selection until May which was unusually late for the proper congratulations they were due. Please congratulate them yourselves. The national nominees and state winners for this year's round are listed in this issue, as well. More congratulations to them and our sincere thanks. The next round will begin soon. Brochures will be sent to all schools and all ISTA members for your consideration.

A most important development for science education in our state has been the release of the revised Learning Standards. At this writing the State Board of Education will be voting on the adoption of these standards for our classrooms. I really do hope that this will allow us to help our students and ourselves more effectively as we all are learning science. I know that there will be many efforts on many different levels to encourage our utilization of these goals, standards and benchmarks for science. It was our intention to promote the active integration of all three of the Science goals in whatever science unit any of us present — process with content and its connections — for everything. I hope that you can take advantage of every opportunity to learn more about the standards.

I also wanted to update you on the status of the earth and space science project, Near and Far Sciences in Illinois. The work that has been done so far is very exciting and will hopefully provide a valuable resource for the regional offices in the future. We divided the state into seven regions for delivery of three of the six training sessions. These sessions will focus on Meteorology, Astronomy and Geology, led by experts in their fields with local or regional resource accents. We will be including the strategy of Action Research for the teachers to learn/study and teach as a part of the class requirements. We will be prepared for 224 teachers throughout the state. We plan to focus on the adult learners first, modeling innovative instructional strategies and then address the instructional benchmarks proposed from the state's standards project in the teachers' teaching levels. We will start with the earth/space science benchmarks, while considering appropriate Goal 11 and 13 benchmarks simultaneously. The long-range goals for this project include sharing the expertise developed by the teacher/leader participants in this project as a resource for your own ROE/ISC offices. I offered several other full articles summarizing other projects proposed for us in this year. One of these articles is about the progress of our project on Integrating Education in Science and Technology, a secondary teacher project for this issue. It will be an exciting project as well.

There will be several opportunities in the fall relating to the issues of safety — developing policies at the school and district level about acquistion, inventory, storage and disposal of chemicals. Your school should have received the last three chapters for the Guidelines for School Science Safety this summer. These chapters include Life, K-8 and Outdoor Classroom Safety issues. They were sent to all K-8 districts and all high schools in the state. Surely that is enough to keep me busy. Just a little more about me — I have been named the National Coordinator for the Presidential Awards for Excellence in Science Education, to work with the National Science Foundation in its efforts for this program. Sometimes I can squeeze in more than 24 hours in my days. Please contact me if there is some way that I might be able to help or even to share your spectacular good news of great things in your science classroom. Everybody loves to hear the good news, even your state science bureaucrat!

ATTENTION SCIENCE EDUCATION LEADERS IN ILLINOIS

:A group of science education leaders in Illinois have begun work on the creation of a science education leadership association for those who fill positions of science department of chairperson, science supervisors, or science lead teachers. Goals include:

- advancement of science education leadership talents and skills for all Illinois schools;
- enhancement of the professional competence and status of leaders in science education through opportunities to learn, discuss and take action on matters of common interest and concern;
- promotion of leadership and networking potential for current and future science education teacher/leaders.

We plan to formally organize an Illinois Science Education Leadership Association, in affiliation with the National Science Education Leadership Association. We represent IABT, the DuPage and South Suburban Science Supervisors Associations and the Chicago Public Schools.Planning Committee members include: Kelly Hock, Karlene Hubbard, Pat LaMaster, Warren Bjork, Melanie Wojtulewicz, Gwen Pollock, Doug Dirks, John Buchanan, Julie Callan, Carl Koch and Marvin Orr. Some possibilities are a statewide pre-conference in conjunction with the ISTA annual fall convention, spring mini-conferences at regional levels, newsletters, and a summer retreat for special emphasis issues. If you are interested in learning more, write: **Marvin Orr, Lincoln-Way High School, 1801 E. Lincoln Highway, New Lenox, IL 60451.**

THE REALMS OF LIFE CHART SERIES

- Huge, 38 x 50″ classroom charts
- Exquisite use of color images
- Features the five kingdoms plus viruses

Based on the Five Kingdoms Classification System, with a separate chart on viruses, Carolina's new *Realms of Life* series provides a clear perspective on the realms of organisms on Earth. Each chart lists the defining characteristics of a kingdom and displays representative organisms. Most are in full color, with computer enhanced electron micrographs of bacteria and viruses to provide striking close-ups. Individual charts have a sturdy plastic strip with eyelets at the top for easy hanging and are available for $19.95 each.

To order call 1-800-334-5551

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"PLUGGING INTO THE FUTURE"

1998 Annual Meeting of Illinois Science Teachers Association
October 9 - 10, 1998
Pheasant Run Resort and Convention Center
St. Charles, Illinois
CALL FOR PAPERS
DEADLINE FOR SUBMISSION: APRIL 15, 1998

PLEASE COMPLETE A FORM FOR EACH PARTICIPANT (You may duplicate this form).

I can be available for: O Friday's program O Saturday's program O either day

Please print or type:

Name	Day phone
Affiliation (School or Organization)	Home phone
Address of above organization	Home address
City, State, Zip Code	City, State, Zip Code

Title of presentation (10 word maxmum) _____

_____

Program description as you wish to appear in the program book (25 word maximum)

_____

_____

_____

Due to limited space, presentations must be limited to 50 minutes.

I. Type of Session
- O hands-on workshop
- O demonstration
- O contributed paper
- O panel
- O other

II. Intended Audience
- O preschool
- O elementary
- O middle/jr. high
- O high school
- O college
- O supervision
- O general
- O teacher preparation
- O other

III. Subject Area
- O astronomy
- O biology
- O chemistry
- O earth science
- O physics
- O ecology/environment
- O science/tech/society
- O other

IV. Equipment Required: O overhead projector O slide projector

Note: Convention will furnish only overhead, screen, and 35mm slide projector. All other equipment, including computers, will be furnished by presenters. If you need special equipment, contact Diana Dummitt for information. No internet connections provided!

V. How many participants can you accommodate at your session? O 30-50 O 51-80

Please attach a one page abstract of your proposed presentation.

As a professional, nonprofit organization, the Association is unable to reimburse participants for travel or other conference expenses. ALL PARTICIPANTS INCLUDING PRESENTERS, ARE REQUIRED TO REGISTER FOR THE CONFERENCE. This form is not for commercial or non-commercial exhibits. It is only for educators!

ALL ISTA Presentations are required to conform with the NSTA safety guidelines!

Signature _____ Date _____

Send signed form and abstract to: Linda O'Connor, Regional Office of Education, 421 North County Farm Road, Wheaton, IL 60187

ILLINOIS SCIENCE TEACHERS ASSOCIATION
SECOND ANNUAL SCIENCE IN THE SOUTH CONFERENCE
SOUTHERN ILLINOIS UNIVERSITY AT CARBONDALE
FRIDAY, MARCH 13, 1998

CALL FOR PAPERS

Any science-related topics that would be of interest to K-12 science teachers. Hands-on, applied, and activity-oriented sessions/workshops would be preferred.

DEADLINE FOR SUBMISSION: POSTMARKED BY NOVEMBER 4, 1997

Complete (print or type) a form for each workshop. This form may be duplicated.

Principal presenter:

Name_____

Affiliation/School_____

Mailing Address_____

City, State, Zip_____

Day phone_(____)_____

Evening ___(____)_____

Additional presenter(s) should be listed with all of the above information of back.

Check time preferred: _____ 50-minute session _____ 70-minute workshop

Title of Presentation_____

Program Description (exactly how you want it to appear) 30 word maximum:

_____

_____

_____

_____

_____

Check the Intended Audience: (any or all) ___K-3, ___4-6, ___7-8, ___9-12, ___ Administration

In order to minimize costs, presenters are encouraged to bring their own equipment when possible. Audio Visual Equipment required:_____

_____

SAFETY: Will you be using chemicals or hazardous materials? _____ If yes, please describe:

_____

Principal presenter will receive a complimentary registration and lunch. Additional presenters will receive a complimentary registration but will pay a $10.00 fee for lunch.

Signature_____ Date_____

Return to: Sandy Rhoads
Division of Continuing Education
Mailcode 6705
Southern Illinois University
Carbondale, IL 62901

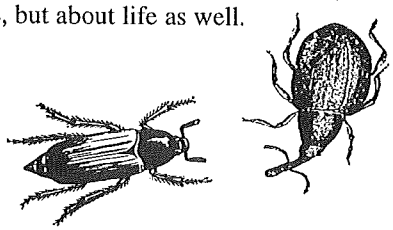
(618) 536-7751
FAX: 618-453-5680

ARTICLES

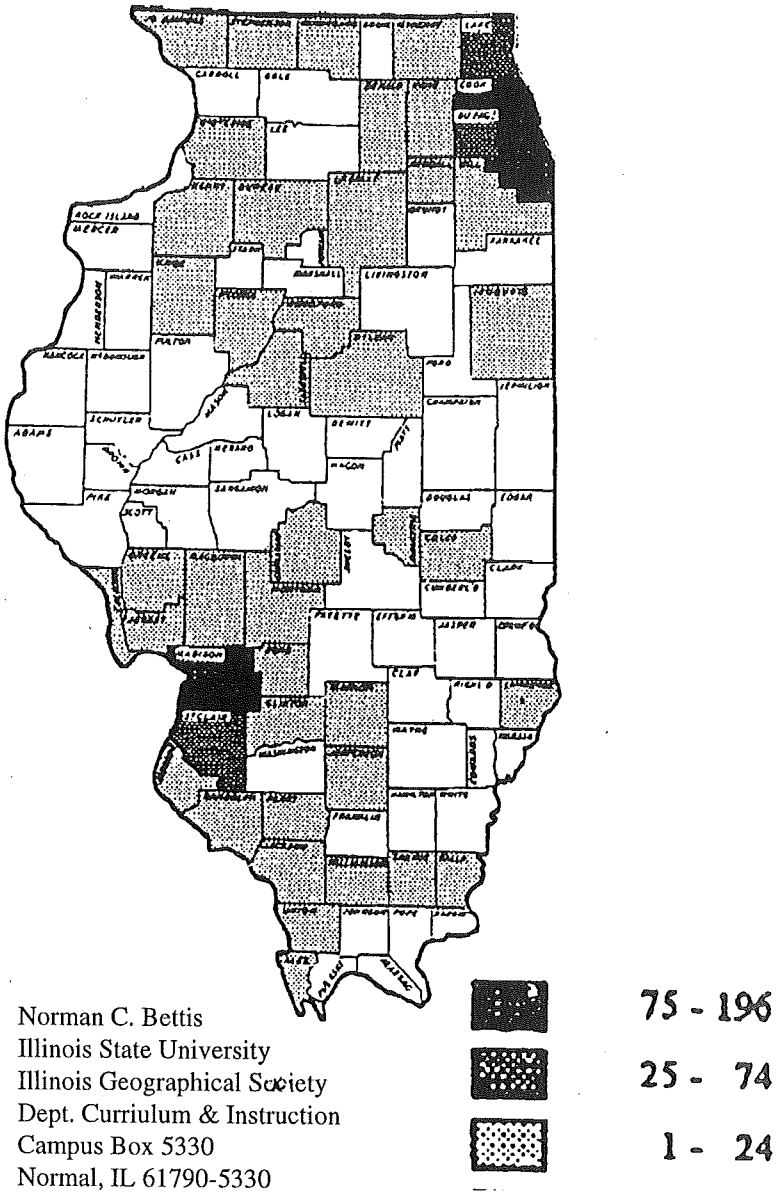
Sue Padilla
Niles West High School
Oakton at Edens Expressway
Skokie, IL 60077

THE IDEAL SCIENCE TEACHER

The ideal science teacher does not know the answer to every question. She is sometimes a little disorganized, almost disheveled, but manages to make it through the day by the skin of her teeth. The ideal science teacher, to this day, still has to look up the functions of m, t, and r-RNA. She has bad hair days, falls off the caffeine wagon weekly, and has permanent red ink spots on her hands, but she manages to stumble into class at exactly 7:07 a.m. The ideal science teacher has an old car that is almost impossible to parallel park, yet she can maneuver even the trickiest of microscopes. She is knowledgeable about the Internet, accesses the World Wide Web daily, and has even joined some science list-servs, but forgets her password constantly. The ideal science teacher has the same list of things to do everyday, yet is always thinking about tomorrow. She also tells some really bad jokes that even the gifted kids don't laugh at and spells the word "separate" wrong sometimes. The ideal science teacher would not make a good English teacher, but she loves her students, even the ones that 'secretly' count how many times she's said "And blah, blah, blah. . ." during class. She loves plants, but has thumbs so brown that she requires students to care for the greenhouse. The ideal science teacher engages her students, but challenges them. She is theoretical, but practical. She talks a lot, but listens as much. She has high expectations, but is realistic. She is spontaneous, yet still has a lesson plan. The ideal science teacher is an eternal student, learning something new everyday. She is neither ideal, nor truly a "teacher." She is an overgrown student who loves to learn and can tell a good story that inspires others to love to learn not only about science, but about life as well.



DISTRIBUTION OF IGA TEACHER CONSULTANTS



Norman C. Bettis
Illinois State University
Illinois Geographical Society
Dept. Curriulum & Instruction
Campus Box 5330
Normal, IL 61790-5330

TRAINING NEW TEACHER CONSULTANTS FOR IGA'S UNDERSERVICED AREAS

The IGA has been involved in the training of teacher consultants (TCs) since 1987 when we became an alliance with the National Geographic Society. A small cadre of teachers was selected during the early years for special training in NGS institutes in Washington, DC, but the vast majority of our TCs have been trained in our own summer institutes at cooperating universities in the state. Over the past ten years six different universities have sponsored one or more IGA summer institutes. Northeastern, Southern at Edwardsville, and Illinois State have been the sites for most of the alliance institutes. By September of 1996 the IGA had five hundred TCs working in the schools of Illinois.

The map shows the distribution of TCs by county throughout the state. Not unexpectedly, the greatest concentration of TCs is found in counties near those universities that sponsored the most summer institutes, i.e. Northeastern and Southern at Edwardsville, and that held commuter institutes. Illinois State's institutes have all been residential, drawing teachers from various areas of the state. Only two counties, Cook with 196 and Madison with 77, have more than 75 TCs. In general, the number of TCs decreases with distance from these core training areas. DuPage with 57 TCs, Lake with 28 TCs, and Kane with 14 TCs illustrate this pattern in northeastern Illinois. St. Clair with 36 TCs shows a similar pattern in southwestern Illinois. Twenty additional counties each claim between 2 and 8 TCs, while each of another twenty have only 1 TC. The 57 counties with no TCs at all form a horizontal hourglass pattern stretching from west central Illinois east through the central part of the state to the Indiana border. Other "empty" TC outlier counties exist in both northern and southern Illinois.

The lack of resident TCs in a county does not mean that IGA has not reached teachers in the area. We have conducted workshops in most areas of the state and regularly participate in well known regional educational conferences, such as the Quincy Conference, the Mt. Vernon Conference, and the Rock Island Conference. In addition, IGA TCs appear frequently on the programs of the annual meetings of the Illinois Geographical Society, the Illinois Council for the Social Studies, and our own annual Fall Conference. Also, IGA TCs often provide inservice activities, such as miniconferences and after school workshops, to teachers in nearby "empty" TC counties. And, of course, our newsletter, GAW packets, and information on the annual Geography Bee go out to teachers all over the state.

So, why are we concerned about "empty" TC areas in the state? Illinois is a large state with over 900 school districts and scores of social science teachers. Our goal must be to develop long-term relationships with all social science teachers in all areas of the state in order to improve systematically the teaching of geography. Occasional, short-term contacts with teachers in these areas is not sufficient to sustain a long-term commitment to the teaching of geography, especially in the schools where it is integrated into another social science and taught by schools in many of these "empty" TC areas where geography is firmly ensconced in the social studies curriculum and is taught by teachers with good training in geography. It is these teachers that we should target for participation in our summer institutes end for association with the IGA as TCs.

Crucial to the success of every IGA summer institute is the commitment of a geography department, a university geographic educator to direct the institute, and well trained TCs to serve on the staff. The IGA has a large cadre of well trained, highly committed TCs who are willing to assist with summer institutes in our "empty" TC areas and we have financial resources that can be used to conduct summer institutes. If we are to succeed in filling in our "empty" TC areas, we must identify and recruit university geographers who are willing to direct summer institutes in these areas. Suggestions and volunteers are welcome.

Geography Awareness Week 1997

"Explore the World! Geography Takes You Places" is the 1997 theme for GAW, which will be celebrated the week of November 16-22. The National Geographic Education Division staff will again prepare a packet of materials packed with classroom activities for all grade levels. Contact the IGA office to obtain your packet of exciting classroom activities.

As in the past, teachers will be encouraged to invite returning Peace Corps volunteers into their classrooms. Contact World Wise Schools, Peace Corps, 1990 K Street, NW, Washington, DC 20526 or visit the web site at www.peacecorps.gov

Technology for All Americans Project
1997 South Main Street, Suite 701
Blacksburg, VA 24061-0353

Dr. Rodney Custer
Standards Team Leader Grades 9-12

ORGANIZATIONAL STRUCTURE FOR THE STANDARDS FOR TECHNOLOGY EDUCATION

One important aspect of any complex and comprehensive development effort has to do with structure and organization. The Technology for All Americans Project is no exception. The challenges associated with defining and organizing the content of technology are extremely difficult given the complex and dynamic nature of the concept. The following paragraphs are designed to provide a brief overview of the organizational structure that is being used by the Standards Team to accomplish this process.

The foundational structure for the standards has been provided in the document *Technology for All Americans: A Rationale and Structure for the Study of Technology* which was developed during Phase I of the project. In that document, a conceptual framework, based on three Universals, is presented and described. These Universals include Processes, Knowledge, and Contexts (see Figure 1). These Universals represent the largest conceptual components in the structure and are designed to be inclusive of the study of technology.

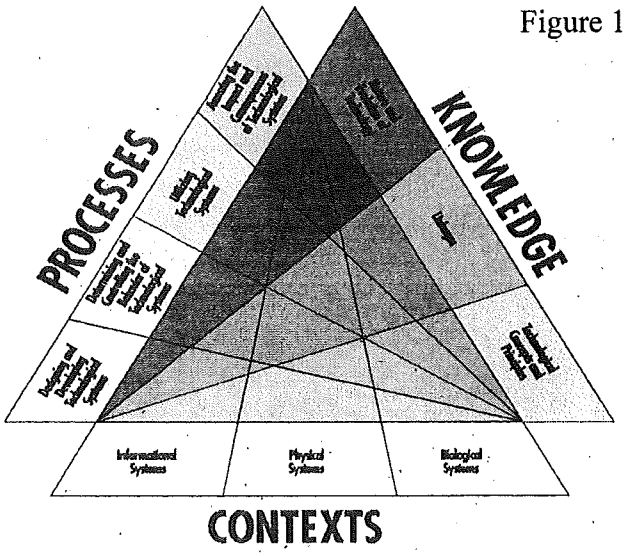


Figure 1

Dimensions of Technology represent the next level of detail. The Processes Universal contains four Dimensions while the Knowledge and Context Universals both contain three Dimensions (see Figure 1). Taken collectively, the Universals and Dimensions represent the conceptual foundation and framework presented in the *Rationale and Structure.*

The work of the Phase II Standards Team is to build on this foundation by refining and detailing the Universals and Dimensions into content standards for the grades K-2, 3-5, 6-8, and 9-12. Writing the standards consists of an overarching set of principles that underlie the vision of technological literacy. The Team has developed an outline to guide the writing of the standards that reflect the thinking of the *Rationale and Structure.*

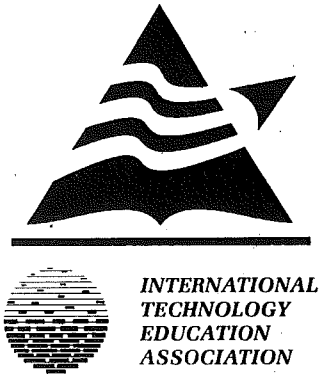
The outline of the standards aids in building a language that describes what every person is expected to know and do in technology. The context of technology involves the many practical reasons why technology is developed, applied, and studied. Those three contexts—Physical Systems, Information Systems, and Biological/Chemical Systems—are therefore being used as the settings of the Content Standards. Physical systems are those that are tangible and made of physical resources and/or transport people and things. Informational Systems are concerned with processing, storing, and using data. Such systems provide the foundation for today's "information age." Finally, Biological/Chemical Systems are being used in such fields as agriculture, medicine, sports, and genetics to make or modify products, to improve humans, plants, and animals, and to develop micro/macro systems for specific use.

Built into the development of the standards are three points checking the progress students are making in technological literacy at the twelfth grade and at the end of the second, fifth, and eighth grade. Each standard will state, as the result of all activities leading up to and including the grade level discussed, the content that is recommended to be understood or developed. Under the Universal of *Processes* and the Dimension of *Designing and Developing Technological Systems* a standard may look like the following:

1.1 In designing and developing, at the twelfth grade level, the technologically literate student in a physical, informational, or biological/chemical setting is able

- to identify the need or purpose of a design.
- to engage in ideation to develop the design.
- to select and clarify the criteria necessary to complete the design.
- to choose appropriate design media.
- to choose the appropriate design tools/machines to help develop the design.

The first draft of the Standards for Technology Education will be ready to view during the consensus workshops starting in October 1997.



INTERNATIONAL TECHNOLOGY EDUCATION ASSOCIATION

A CALL FOR ACTION: WHAT EVERYONE CAN DO

Americans never tire of telling themselves that they have created a technological society. We even seem to be delighted about this and many believe that the pathway to improved life is through continuous technological innovation. Whether this is true or not is debatable, but I think we can all agree that technological literacy is as important as cultural literacy in our modern world. Without a good grounding in the study of technology, we will become technopeasants in the new millennium of the 21st century. If this is so, then why isn't every child in American school systems given a solid basis in technology education from kindergarten through the twelfth grade? Why are we allowing such an important and vital component of education to be left to an ad hoc approach which children may get in the classroom, but often are left to glean for themselves?

There is a vital need to inform others about the importance of the study of technology in our schools. School officials, teachers, community members, and parents should all be aware of what technology education is and what it means to be technologically literate. They need to learn that what we are talking about is much more than just learning computers or teaching with technology. And, lastly, each one of them needs to become an advocate for technology education in their own community so more and more school systems begin to include technology education as part of their core curriculum.

But how do we inform others about the importance of the study of technology in our schools? What resources are available to each of us to spread the word about the need for technology education for everyone? How can we inform others that we must not confuse the study of technology (technology education) with the teaching of how to use technology (educational technology) exclusively? In a nutshell, where do we begin?

Each of us has a vested interest in the success of technology education, as citizens and as professionals. We are the ones best equipped to inform others and we should be the leaders in spreading the word about technology education and technology education standards to those we come in contact with. There are many resources available that we can use to educate ourselves for this task. One of the richest resources for the promotion of the study of technology is a new document which the Technology for All Americans Project has recently produced called *Technology for All Americans: A Rationale and Structure for the Study of Technology*. It is currently available for purchase through the International Technology. Education Association (ITEA).

In addition to the *Rationale and Structure,* the Technology for All Americans Project homepage is available for anyone to look at and gain more information. The URL is: http://scholar.lib.vt.edu/TAA/TAA.html. Also, ITEA has a number of publications and videos available for purchase that deal with technology education. *The Technology Teacher* and *Technology and Children* are two of the current journals printed throughout the school year. In cooperation with Thompson Learning Tools, ITEA recently produced a video titled, "Technology Education—A New Paradigm." Using a selection of powerful images shot at schools across the country, the video provides an excellent overview of the study of technology and the need for Standards for Technology Education.

We all need to promote technology education as a crucial core subject in schools. The critical message to be told to others is that the study of technology is important to everyone. It is as vital to a "liberal education" as knowing how to read, to write, or to calculate. The message is clear, now is the time to deliver it.

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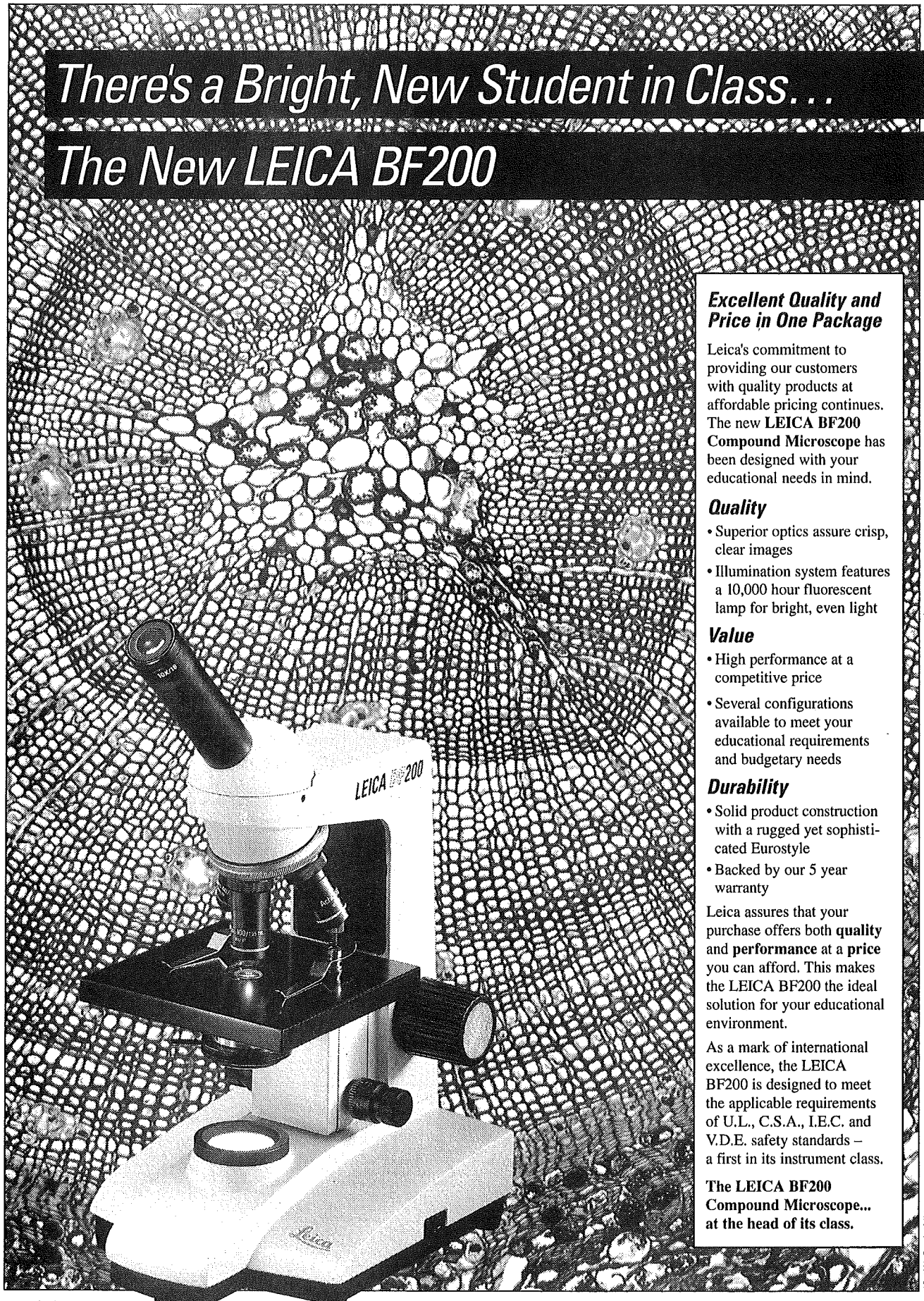

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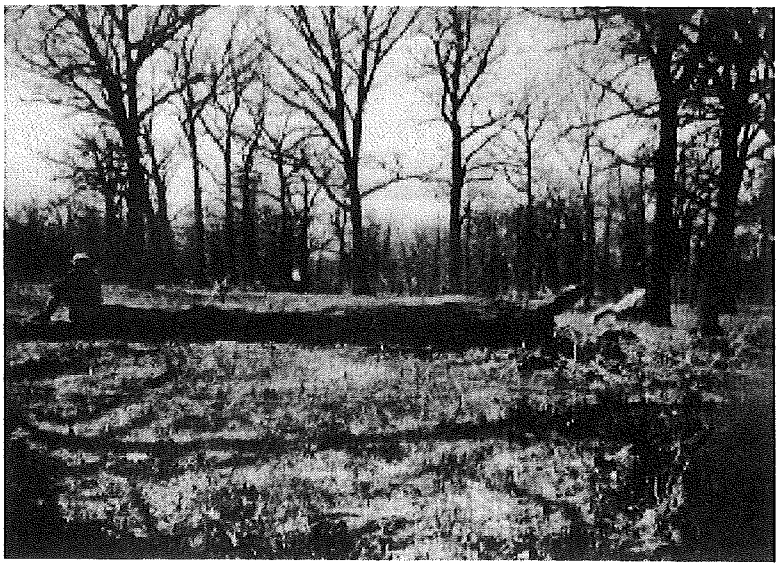
Cheryl Breckinridge (Science)
Carole Hayes (English)
Linda Tilton (Science)
Woodlands Academy of the Sacred Heart
Lake Forest, IL 60045

FIELD STUDY IN LAKE COUNTY ILLINOIS: A BRIEF NATURAL HISTORY, GEOLOGICAL EXAMINATION AND LITERARY REFLECTION OF THIS LAND WE CALL HOME*

It has become clear to us as teachers that there is a need to present opportunities to our students which allow them to relate course concepts and activities directly into their world. In order to accomplish this, science teachers engaged the support of a colleague from the English department whose focus was senior level literature. Together we developed a program which enabled our students to combine the fields of science which they had been focusing on throughout their academic year with their studies in literature and to relate these disciplines to our native landscape in lake county, Illinois. For this study we combined our AP Biology, Earth Science and an honors level senior English class. We used the concepts from our year-long courses as the foundation for understanding our native landscape and incorporated these concepts into an interdisciplinary day-long field study. The literature students were guided in selecting appropriate and meaningful poetry and prose to use at opening and closing reflections as well as during each site presentation. We also had the valuable leadership and support of naturalist Roger Tucker. After weeks of planning we began our field study to observe, record and reflect on the natural history, geology, and biology of our native land.



*This article is illustrated with photographs and narratives taken from student reports.

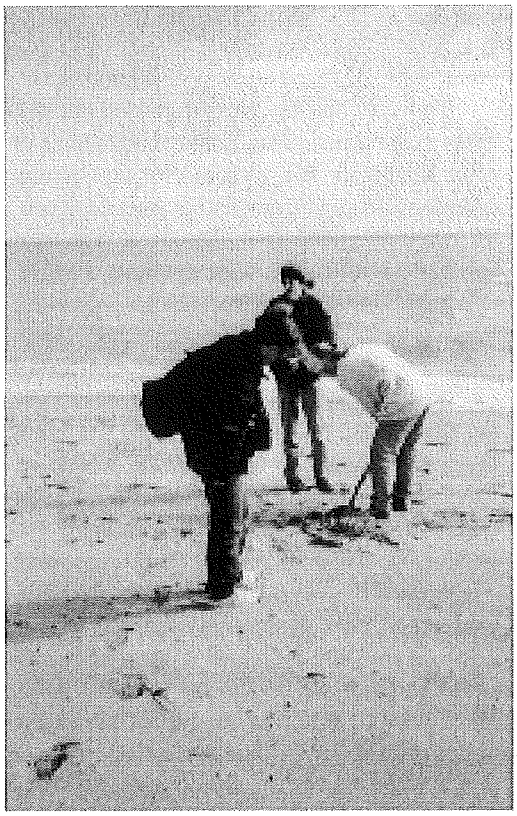
To begin our day we transported our students to the forested lands above the shores of Lake Michigan. We gathered for an opening ceremony adapted from Native American rituals celebrating the four directions and their spiritual significance: East (yellow, sunrise, new beginnings), South (red, daytime, growth), West (black, sunset, fulfillment) and North (white, winter wind, endurance). The effects of glaciation on the landscape and the forests were our first topics. As we walked along the top of the ravine, sloping down toward the lake shore, we focused on erosion, adaptation, and specific species that exist on this fairly remote and undeveloped site. When we reached the shore our focus shifted to the Great Lakes and associated concepts ranging from alien species (e.g. zebra mussels), shore deterioration, dunes, currents, and human effects on the lake front. Since we had followed the top of the ravine down to the lake, we chose the alternate upward path for our return. The bottom stream, which had cut the ravine over the past, now became our focus. We honed in on the action of running water, adaptation and variation of fauna and flora present, and we suggested that students attempt obvious evidence to their understanding of the dynamics of the land. Students presented readings on rocks and ice by Barry Lopez and on wilderness creatures by Czeslaw Milosz. After reaching the top of the ravine, we transported our students to a local park for lunch.

Once in his life a man ought to concentrate his mind upon the remembered earth. He ought to give himself up to a particular landscape in his experience; to look at it from as many angles as he can, to wonder upon it, to dwell upon it.

He ought to imagine that he touches it with his hands at every season and listens to the sounds that are made upon it.

He ought to imagine the creatures there and all the faintest motions of the wind. He ought to recollect the glare of the moon and the colors of the dawn and dusk.

N. Scott Momaday

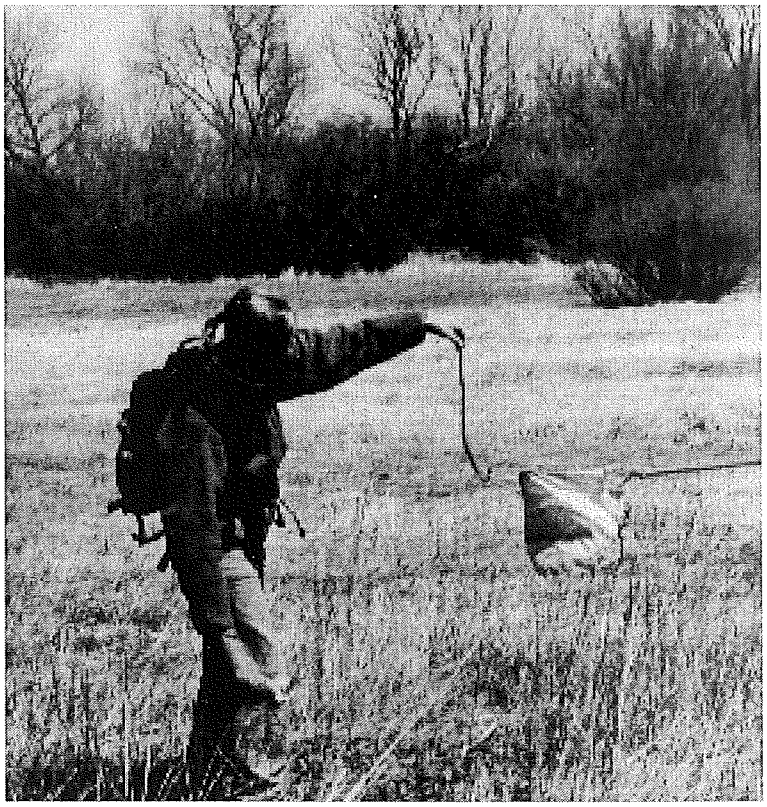


During our brief lunch break, Roger Tucker presented some comments on the role of birds of prey on our ecosystem. He enlivened the lecture with a peregrine falcon perched on his arm, stressing animal adaptations to environment. Students chose readings on birds and other animals by poets Mary Oliver and Pulitzer Prize winner Lisel Mueller of Lake Forest.

After lunch we transported our students to a restored prairie and world class black soil oak savanna operated by Lake Forest Open Lands. A comparison of the ravine, lake front, prairie, savanna and running water systems was our final agenda. Seemingly on cue, a red-tailed hawk swooped, captured and carried a snake while a great blue heron soared over the oak savanna. Up to this point in the day students had worked in teams (see below). Now came the time for solitude. We directed the students to find their own place in the prairie or under a tree in the savanna. After thirty minutes of silent observation and meditation, the students were called back into the large group. Students led a closing ritual which included a reading from N. Scott Momaday on the value of a giving oneself up to a particular landscape. The ceremony concluded with all participating in a Chinook blessing.

Authors whose work the students used included Barry Lopez, Mary Oliver, Lisel Mueller, Czeslaw Milosz, and N. Scott Momaday, Nadya Aisenberg, Wendell Berry, Edmund Carpenter, Cid Cor, Emily Dickinson, John Haines, Alice Ryerson Hayes, Seamus Heaney, John Hollander, Harry Humes, Louis Phillips, Mary Shelley, Percy Bysshe Shelley, Roberta Hill Whiteman, Walt Whitman, Richard Wilbur and several unnamed Native American authors. Teachers planning similar interdisciplinary projects might work up a different list to suit their particular environment. Well in advance of the field experience through class handouts and library folders the ground had been seeded with abundant nature readings. As the teachers hoped students selected wisely and added works of their own choosing to their bibliographies and presentations.

Our students responded enthusiastically to the total experience. They particularly valued the opportunity to relate the concepts they had learned in the classroom with the field experience. Although they were tired, the students said the field day was one of the highlights of the year. The students felt that the literary and scientific connections they discovered were surprisingly rewarding and the faculty involved agreed. Experiences of this nature require long term and careful preparation on the part of both faculty and students but are well worth the effort. We offer the following plan, which we used, to teachers of various disciplines who might want to design a program and adapt it to their needs and native environment.



The landscape conveys an impression of absolute permanence. It is not hostile. It is simply there – untouched, silent and complete. It is very lonely, yet the absence of all human traces gives you the feeling you understand this land and can take your place in it.
Edmund Carpenter

Field Study in Lake County Illinois: A Brief Natural History, Geological Examination and Literary Reflection of This Land We Call Home.

Faculty: Mrs. C. Breckinridge, Mrs. C. Hayes, Mrs. L. Tilton, Mr. R. Tucker, (Lake Forest Open Lands)

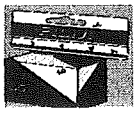
Introduction: The purpose of this field study will be to survey specific geological and biological evidences, collect data, perform environmental inspection and reflect on poetry and prose related to our scientific and natural observations. A photographic journal reflecting the evolution of the land will be prepared by the group and evaluated by the faculty committee. The student's goal will be to use the day to collect data, photos, intellectual insight and understanding of the physical and biological processes which have occurred over the past twenty five thousand years since the retreat of the last continental glaciers. As always, we will continue to evaluate the state of the land under human stewardship. Suggestions of topics for focus will follow in a later section.

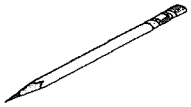
Students will be assigned to interdisciplinary teams. Each team will have members with geological, biological and literary expertise which they will contribute to the team's project. Each student will be held accountable for a specific task/responsibility and the success of the day will depend on the cooperation of each individual.. At the conclusion of the field study, the team will meet on their own time to prepare a "photojournal " which will explain the major concepts as they relate to Lake County, Illinois. As this is a major/culminating activity and will reflect the insights, accomplishments and efforts of the entire year, a major test grade will be determined by the faculty committee and awarded to the members of the group for each course participating. This project will be due approximately three weeks after the completion of the field study.

The Teams: Each interdisciplinary team will determine which member will be responsible for the following positions and submit a roster to the faculty. .

- **Captain** - Organizes the team, meets with faculty during the trip to get any special directions, if necessary breaks ties in decisions to be made by the entire group, keeps the group on task and is responsible to get the job done, take attendance.
- **Co-Captain** - supports the leader and the group, fill in for the leader
- **Recorder** - records in "writing" the days events, prepares notes for group's post trip meetings
- **Photographer** - photographs what the group determines it wants for the project
- **Equipment Officer** - responsible for securing and transporting any/all laboratory equipment—this person does not necessarily ***carry*** the ***equipment*** all day, but is **responsible** for it.

*Team members are expected to back each other's responsibilities in this ***collaborative*** activity.



Expenses - The cost of the film, developing and materials/supplies for the project should be equally shared by all members of the group.

The Challenge: Use the activities of the day to amass evidence for the events which have led to the creation of our native land. Activities, discussions, and reflections which will occur will provide you with ideas and information to prepare your project. The project will reflect your group's understanding of how we got here, and what the condition of the natural land was, is, and may become. Your grade depends on your group's ability to reflect what you have learned during this year and especially on this day and subsequently how you relate your understanding of the concepts to the field study.

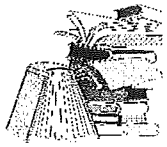
The Focus:

Geological Evidences:

- Forces which attack the surface: erosion; running water, wind
- Glaciation
- Human interference with natural processes (physical manipulation, pollution)
- Rocks and minerals
- Fire on the prairie, how fire has shaped the land

Biological Evidences:

- Evolution, speciation
- Adaptations
- Ecosystems,. biomes, habitats—Great Lakes, dunes, beaches, ravines, mature forest, prairie, wetlands, oak savanna
- Niches, prey-predator relationships
- Extinction
- Habitat destruction
- Alien specie



Evidences and Inspirations found in Literature:

- Lake front (*opening reflection)
- At the top of the ravine
- Prairie
- Middle fork savanna
- *Closing reflection

Sites to be visited:

lake front (*Great Lakes)
beach/dunes
ravine
stream
top of the ravine
prairie
wetland
oak savanna

Special Directions:

This is a "field study" and field gear is required. Sturdy shoes, (waders, water tight boots, hiking boots) are essential. Wear heavy jeans, (NO sweat pants, tights, shorts), layers of shirts—sweatshirts are better than sweaters, jacket (nylon wind jacket or parka) and bring rain gear.

Do not wear any colognes, hair sprays or sweet smelling cosmetics as they attract insects. Bring no electronic equipment, phones and wear no expensive jewelry. There is always the potential for falling into ponds, streams (VERY MUDDY POTENTIAL) etc, so don't wear or bring anything that you would be devastated to lose or get muddy. Use common sense and remember the Biology I field days; then multiply by ten. This will be a physically and mentally challenging day, so be prepared.

Students from previous field studies recommend that you pack a hearty lunch. No one will be permitted to participate without a lunch. The faculty committee wants you to be at your best, and hungry and tired wear thin on group dynamics.

Post Field Study

The entire group will meet together during one predetermined lunch period to debrief, answer questions, and allow the teams planning and discussion time. The teams will then be expected to meet independently to prepare the project.

Water Studies

Site_____ **Group Number**_____

Physical Evidence Observed

_____

Dissolved Oxygen -

- **Instant-**_____
- **LaMotte-**_____

_____

pH

_____

Water Temperature_____**°C**

_____

Turbidity (How clear? Use a scale)

_____

Muddy←----------→Cloudy ←----------→Clear
1<----------→10

_____

Survey of Biotics present
(What organisms are present? What evidence of life?

_____

Survey of bed/bank
(muddy, eroded, rocky, steep, broad, other)

_____

Rate of Flow
(estimate velocity)

no visible movement←----------→very fast
1----------10

_____

Thomas O. Jewett
Assistant Professor
Department of Curriculum and Instruction
Southern Illinois University-Edwardsville

BAIT-SHOP BONANZA

Looking for low maintenance, high motivation critters for the classroom? Try your local bait-shop. Such pupil pleasers as meal worms, crickets, earthworms, leeches, minnows and crayfish will be found there for minimal cost. They can be utilized for a variety of science, research and language arts activities.

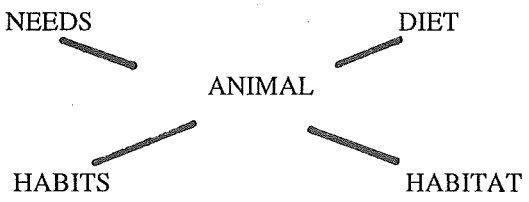
I first became aware of this zoological treasure-trove when setting up a classroom aquarium. The price differential between the bait-shop and pet store were phenomenal. And, the bait-shop specimens were much hardier and just as pleasing for the students as their more colorful tropical cousins.

On a student developmental note, pre-operational and early concrete children are experiential. Personal experience is believing to them and is the mental framework upon which they build. Many of these students perceive that all fish are tropical because that is all they have seen or experienced. They are often amazed that the fish they catch in a local lake or pond is not an angel fish or a tetra.

I usually divide the class into cooperative groups that will "adopt" each of the bait-shop critters. Before the students actually receive their charges they need to gather information about tending for their chosen animals.

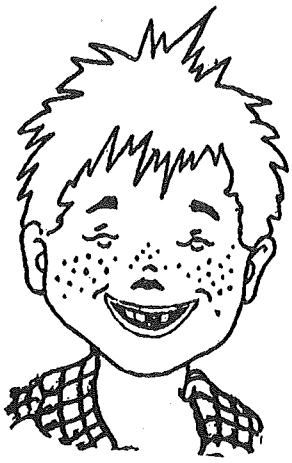
Karl Matz's "Look What Followed Me Home, Mom" article in Science and Children, Feb., 1990, provides a great language arts and research activity to accomplish this function. Students develop a "Care and Feeding of Your Pet" manual similar to the ones found in pet shops, concerning less exotic animals.

Student groups begin by drawing a semantic map that points out areas that need to be investigated. A possible map might look like :



The map provides the students with specific ideas of what to research for and how to organize their findings.

After researching, the students get to know their animals. They observe close up, and later quantify by measuring, and relate their findings in science journals. Even kindergartners can accomplish this task through drawings and creative spelling. They can collate their findings in class "big books." (See "Making First-Class Books" by Charlotte King in Nov./Dec., 1990, Science and Children.)



After research into the appropriate environment and care and feeding, the bait-shop critters become the charge of each group. When possible, try to mix the specimens together, but each can be kept in their own biome that the students create.

Minnows, of course, are kept in an aquarium. Try to get some local fauna from ponds and streams. Fresh water mussels and clams become an added attraction. Crayfish can also be introduced into this environment.

Otherwise, crawfish do great and are easily observed in a small, round, plastic wading pool. Fill the bottom with gravel, rocks and about two inches of water. Let tap water sit for a day before introducing the critters to their new home. This will allow the chlorine in the water to dissipate. Crayfish are scavengers and will eat about anything.

Leeches are parasites and should be maintained in a separate aquarium. I usually feed them raw liver from which they can extract their nourishment.

Crickets can be kept in a wire cage or an aquarium with a wire mesh top. Feed them leftover vegetable matter. Water can be provided by a saturated sponge. Crickets can be quite noisy but students get use to their chirping.

Meal worms can find a home in an old aquarium or fishbowl. Fill about three quarters full with bran flakes. A wedge of raw potato will take care of liquid requirements. Students will be able to observe them going through the stage of complete metamorphosis.

Earthworms can be raised in two liter soda bottles. This allows students to observe their burrows. Good rich soil should provide the basis for the worm's home. Moisten the ground periodically. Feed vegetable matter by just putting on the top soil. These critters are so easy to keep, that I have had all the students in a class each have their own "worm bottle."

As stated earlier this bait-shop bonanza provides for inexpensive, low maintenance classroom pets. Only the minnows need daily care. I have left the other critters with enough food to last them through a Christmas break with no ill-effects. They give the student unusual and highly motivating subjects to observe, research, and write about.

Abour H. Cherif, Ph.D.
Science & Mathematics Department
Columbia College Chicago

Stefanos Gialamas, Ph.D.
Division of Educational Studies
The Illinois Institute of Art, Chicago

Elaine E. Simos, B.A.
Artistotle Academy
Des Plaines and Palos Hills, IL

SCIENCE AND MATHEMATICS: INTEGRATING THE TEACHING OF SCIENCE, MATH, AND SOCIAL STUDIES IN RELEVANT CONTEXT

How would you like to go into your classroom with only 41 cents (a penny, a nickel, a dime, and a quarter), or multiples of 41 cents, and turn your classroom into an effective learning environment for your students and an enjoyable teaching experience for yourself? In these interdisciplinary activities, we will demonstrate how teachers can use 41 cents as an effective teaching tool to teach various topics and in different disciplines such as science (biology, chemistry, geology, and physics) mathematics, social studies, and language arts. The approach is easy to use, cheap, mobile, and maximizes the students' understanding of the intended learning concepts.

The activities are divided into two parts. Part one and two include activities that deal with science and/or math concepts, principles, and ideas. Part three includes activities that deals topics in social sciences, and language arts.

PART I: SCIENCE

Volume vs. Mass

Many students in grades K-12 have difficulty in distinguishing between mass and volume and their measurement and calculation. Mass is a measure of the amount of matter as determined by either its weight or by Newton's second law of motion. Since the weight is the result of gravitational force, any object would be weightless if gravity did not exist; however, this object would still contains the same amount of matter. Volume, on the other hand, is the amount of space that matter occupies. Anything that has mass and volume is consider matter.

Needed Materials For These Activities:

1. Quarters, dimes, and nickels, some minted prior to 1965 and some minted after 1965. This is crucial because in 1965, the content of the coins were changed. Also, pennies, some minted prior to 1975 and some minted after 1980.
2. Clear regular drinking glasses.
3. Paper and pencils for writing and measurement

Activity 1
How Many Pennies Can Each Glass Hold?

1. Divide class into groups of two students.
2. Mix pennies with different dates and give a specific number of them to each group of students.
3. Give each group of two students one clean drinking glass filled with water to the brim.
4. Ask the students to predict how many pennies they need to immerse in the glass before the water overflows!
5. Record students' predictions on the blackboard and ask them to record their own data on their data collection sheets.
6. Have the students begin the experiment; in each group, one student puts the pennies slowly into the glass and the other student observes and records the observations.

To the surprise of the students, many will have a different result. Record the results on the blackboard and compare them to students' predictions. If there is time, have the students plot a graph using graph paper. Ask the big question: "Why did we arrive at different results?" This will lead the students to concepts in volume and mass.

Activity 2
How Many Different Coins Can Each Glass Hold?

1. Divide the quarters, dimes, nickels and pennies into two sets one minted before 1965 (before 1975 for the pennies) and the other after 1965 (after 1980 for the pennies).
2. Divide the students into two groups: group I and group II.
3. Divide each group into sub-groups of two students.
4. Give each sub-group in group I an equal number of quarters, dimes, nickels and pennies that were minted before 1965 (before 1975 for the pennies).
5. Give each sub-group of students in group II an equal number of quarters, dimes, nickels and pennies that were minted after 1965 (after 1980 for the pennies).
6. Give each sub-group one clean drinking glass filled to the brim with tap water.
7. Ask the students, if we slowly drop (in order) one penny, then one nickel, then one dime, then one quarter, then one penny, and so on, how many coins do you need to drop in the glass before it overflows?
8. Record students' predictions on the blackboard and ask them to record their own data in their data collection sheet.
9. Have the students begin the experiment; one student slowly and carefully drops the coins vertically (with their edges first) into the glass and the other student observes what happens and records the data.
10. Record the results on the blackboard and compare them to the students' predictions. Then ask the big question: "Why did we arrive at different results?" This will lead the students to concepts of mass and volume. Students should also be asked to infer whether or not there is a relationship between the weight and the size of each coin and its money value.

These activities can also be used to introduce students to the concepts of surface tension.

Flotation and Mass

Needed Materials For This Activity:

1. Quarters, dimes, nickels and pennies, some minted prior to 1965 and some minted after 1965.
2. Four one-gallon plastic containers (one for each four students).
3. Jar caps with different areas (four different caps for each four students)
3. paper and pencils for writing and measurement.

Activity 3
How Many Coins Can You Balance On a Floating Object?

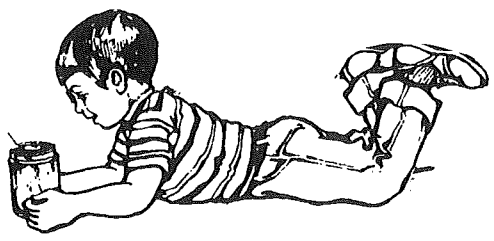
1. Divide the class into groups of four students.
2. Give each group (four students) one plastic container, one set of jar caps (each with a different surface area), and an equal number of quarters, dimes, nickels and pennies.
3. Ask the students to fill the plastic container with water (about half full), and one at a time, float the four different jar caps on the water. Decide which coins (quarters, dimes, nickels, or pennies) to put in each bottle cap, use these combinations for all the students. (For instance, put the quarters in the largest cap, the nickels in the next largest)
4. Before they begin, have the students record their predictions on their data collection sheet, and put their predictions on the blackboard.
5. Begin the experiment. Each group of four students will fill and record the result for one bottle cap.
6. Record the students' results and compare them to students' predictions. Ask the question: "What is the relationship among surface area, weight and flotation? This question will lead to astonishing discussions among students.

Coins and Electricity

In this activity, we will help students discover which coins can conduct electricity and why.

Materials needed For This Activity:

1. Small light bulbs (one for each group of two students).
2. Wire.
3. "C" batteries (one for each group of two students).
4. 2 sets (one set of two for each group).



Activity 4
Which Coin Conducts Electricity Best?

1. Using a small light bulb with wires, attach one wire to the negative end of a "C" battery.
2. Experiment by putting coins on the positive end of the battery and touching a wire to them. (2 sets of coins are needed, one minted before 1965 and another minted after 1965).
3. Using a roll of coins, attach wires to each end of the roll to produce an electric current.
4. Attach a small battery and a light bulb to one wire to create a closed circuit.
5. Discover which coins, quarters, dimes, nickels, or pennies produces the strongest current (brighter light).
6. Hypothesize why different coins produce different strength of current.

Coins, Magnetic Field, and Metal Detectors

Many students have seen people with metal detectors moving around the sand beaches (to find buried coins and other metal objects), and might have wondered how they work. Coins are good electrical conductors but can not be picked up by a magnet, (with the exception of the 1943 penny). Coins can easily be detected by metal detectors. It is magnetism that makes a metal detector work. Before explaining to the students how metal detectors work, they have to know the relationship between electricity and magnetism.

The relationship between electricity and magnetism was first discovered accidentally almost 200 years ago by a Danish physicist Hans Christian Oersted (1777-1851) noticed that moving electric charges or currents through wires produced a magnetic effect that caused a compass needle to move. Since than, it has become known that an electric current can produce a magnetic field, a phenomena that has turn out to be one of the most important practical discoveries ever made. The metal detector is one of those practical implications. It works by generating a magnetic field.

In general, a metal detector " is made up of a short pole with two ends. On one end, there is a flat coil (loops) of wire (called electromagnet) and at the other end is a handle and a box containing a battery and electronic circuits. As soon as a person moves the coil of the metal detector above the ground, the battery produces an electric current that sends out a magnetic field from the coil. This magnetic field of the moving coil creates induced electric currents in any buried metal object, such as a coin. The electric current creates a magnetic field around the coin which is then picked up by the metal detector. When the coin's magnetic field is received by the metal detector, the light on the handle of the pole flashes. (Young Scientist, 1995). In other words, when the magnetic field from a metal detector reaches buried coins or any other metal object, it causes coins to generate their own magnetic field which in turn is detected by the metal detector.

The idea of creating electrical currents in a metal object (such as a coin) by the magnetic field of a moving coil is the same mechanism used to detect whether the coins put in a slot machines are real or counterfeit. (Young Scientist, 1995).

When current is running through the loop or loops, every loop produces a magnetic field. Therefore if one increases the number of the loops of wire through which electrical current flows, the strength of the magnetic field will increase in time. As the students to predict which of the four coins can produce stronger magnetic field and why. Students should know or discover that it is the electric current running through a number of loops of wire rather than the coins which produce the magnetic field.

Coins And Corrosion

Coins can be used to introduce corrosion in the classroom. Most students have seen rust and are familiar with the role water plays in causing rust. Most of us have seen and probably dropped coins into water fountains. Why are these coins not rusted. Rust (Iron Oxide) is the most common form of corrosion that is caused by the reaction of iron and water.

Oxygen (O_2), carbon dioxide (CO_2), hydrogen sulfide (H_2S), and water vapor (H_2O), are known to cause gradual wearing away of some metals, and or gradual changing of the original color of some other metals. These gases react chemically with some materials and cause distinct physical changes. These processes of change are called corrosion. For example, nickel is corroded by oxygen, copper is corroded by carbon dioxide, water vapor, and or hydrogen sulfide, and silver is corroded or tarnished by hydrogen sulfide. Ask students to predict what would happened if they expose the four different coins to oxygen, carbon dioxide, water vapor, and or hydrogen sulfide. Collect the students' predictions and discuss them with the students. Ask students to design their own experiments that enable them to examine the effects of gases such as oxygen (O_2), carbon dioxide (CO_2), hydrogen sulfide (H_2S), and water vapor (H_2O), on U.S. coins. When copper reacts with carbon dioxide, water, or hydrogen sulfide, for example, its color changes from reddish-orange to green. When silver reacts with hydrogen sulfide, its color changes to black.

To examine the effects of sulfur compounds on silver, divide the students into groups of four. Give each group four hard-boiled eggs, and four different clean-shiny coins (a quarter, dime, nickel and penny). Ask the students to peel the four eggs, and then to push the first coin half way into the white of the first egg; push the second coin into the white of the second egg, and so on. Wait about 10-15 minutes before removing the coins, then ask the students to record their observations and to compare them to the findings of the other students. The egg white contains sulfur, and silver reacts with many sulfur compounds.

PART II MATHEMATICS
Volume and Area

Needed Materials For This Activity:

1. Various sizes of shoe boxes.
2. Various coins (quarters, dimes, nickels and pennies).
3. Graph paper, rulers, pencils, and a variety of coin wrappers that are perform ready to use.
4. Micrometers.

For students to be able to solve this problem, they must know how to measure the dimensions of both a shoe box and a coin in order to determine their volume. The maximum number of coins that can fit in an average shoe box will be the volume of the shoe box divided by the volume of coins. Since the coins are cylindrical and the shoe box is cubic, students' results will not be exact.

Coins And Corrosion

Metal	Corrosion by	Color Change
Iron	Water vapor & Oxygen	From Dark-silver-gray To Reddish brown
Nickel	Oxygen	From Light-silver-gray To Pale blue
Copper	Carbon dioxide Water vapor , & Hydrogen sulfide	From Reddish-orange To Green
Silver	Hydrogen sulfide	From Silver To Black

Appendix A
Old U.S.A. Coin Composition

Coin	Composition
Pennies	1943 only - steel 1944 and 1945 - copper (shell case) All other dates - standard copper/zinc (?).
Nickels	1942 through 1945 - 30% silver, 60% copper, 10% zinc All other dates - standard copper/nickel alloy.
Dimes	Before 1965 - 91 % fine silver. 1965 and after - copper/nickel on copper (sandwich construct).
Quarters	Before 1965 - 91 % fine silver. 1965 and after - copper/nickel on copper (sandwich construct).
Half Dollars	Before 1965 - 91 % fine silver. 1965 and after - copper/nickel on copper (sandwich construct).

The Approximate Area Four Different Coins

Penny	Nickle	Dime	Quarters
20 mm = d	18 mm = d	17 mm = d	24 mm = d
r = 10 mm	r = 9 mm	r = 8.5 mm	r = 12 mm
A = π r	A = π r	A = π r	A = π r
= 3.14 x 10	= 3.14 x 9	= 3.14 x (8.5)	= 3.14 x (12)
= 314 sg.mm	=254.34 sgmm	= 226. 87sg.mm	= 452.16 sg.mm

Activity 1
How many coins can you fit in a shoe box?

1.Divide the students into groups of three.
2.Give each group graph paper, ruler, shoe boxes, a micrometer, and mixed coin wrappers.
3. Give each group an equal number of quarters, dimes, nickels, and pennies.
4. Ask each group, using one kind of coin each time, how many coins they will need to fill an average shoe box?
5. Give students enough time to think about this problem and how to solve it before you provide help.
6. When they solve the problem, ask them what kind of shoes they can purchase with this money.
Let them solve the problem on their own and devise their own equations. Ask them to design at least two different approaches to solving it. Each group should be prepared to discuss its equations with the class. Some students came up with this equation:

$N = \frac{L}{l}$ L = length of larger object (shoe box)
l = length of smaller object (coin)
N = Number of the coins needed to fill the shoebox

See appendix B for the approximate circular area of four different coins.

Activity 2
Minimum Area of Plane Figures

1. Consider the following geometric plane figures: rectangle, square, circle, parallelogram, trapezoid, rhombus, and kite.
2. Provide the students with the formulae for the corresponding figures.
3. Instruct the students to place all 41 pennies inside each geometric figure.
4. Students must measure the necessary dimensions to find the corresponding area.
5. When they realize that the coins do not occupy all the figure's available space, ask them to reduce the dimensions until they cannot reduce them further.
6. Students must record the dimensions of their geometric figures and calculate their areas.
7. Students create a histogram with their observations and decide what is the minimum area among all observations and among all plane figures.

See appendix C for area formulas of plane figures.

Activity 3
Minimum Volume of Geometric Solid.

1. Consider the following solids: cylinder, cone, pyramid, parallelepiped, and cube.
2. Provide the students with all necessary formulae.
3. Instruct the students place all 41 pennies inside each solid.
4. Students must measure the necessary dimensions in order to find the corresponding volume.
5. If they realize that the coins did not occupy all available space inside the solid, ask them to reduce the dimensions until they have the smallest possible dimensions (according to them).
6. Students must record the dimensions of their geometric solids and calculate their volume.
7. Students must create a histogram with their observations and decide which solid has the least volume.

See appendix D for volume formulas of geometric solid.

Combinatorics

1. In how many ways can we arrange 41 coins in groups of 8 coins and 1 coin?

Combinatorics is the manipulation of mathematical elements in sets.

Probability

Given 41 coins distributed as follows:

a) 12 coins, year 1964
b) 10 coins, year 1965
c) 8 coins, year 1969
d) 7 coins, year 1975
e) 4 coins, year 1979

Then ask:

a) What is the probability to get a coin of year 1975 out of all of the coins?
b) What is the probability of choosing a coin produced in an even new year?

Learning Graphs

1. Divide the students into groups of two.
2. Give each group lots of mixed coins, a graph paper, a ruler, and a pencil.
3. Ask each group to sort the coins by years. Then make a graph based on the mint date of the coins.

Part III
MAKING THE CONNECTION WITH OTHER DISCIPLINES

41 Cents can also be used by teachers from other disciplines as a learning tool and/or as a starting point in teaching various subjects. The following are only a few examples—be inventive in adapting these activities to fit your instructional demands.

SOCIAL STUDIES

Activity 1
Making Sense of Change Through Time

As a class assignment, ask every student to look for three people, one over 60 years of age, one over 40 years of age, and one over 20 years of age. Have the students ask each person what could you buy with 41 cents when they were the student's age. Ask each student to go to various stores and ask the managers what they could buy from their stores today with 41 cents, then ask each student to write a report about their findings. This report must include what they think about these changes, and what it means for their own future (when they reach 40 or 60 years of age).

Activity 2
Money Throughout the Globe

Assign each student four countries. Ask the students to locate the countries on a map, and to do some reading to familiarize themselves with these countries. In the course of the assignment, take the students to the learning center at your school to conduct research. The students must determine what currency "their" countries use, what are the denominations of that currency, and what is the current U.S. exchange rate for that currency.

Continuing the assignment, ask the students to go to a bank near their home/school, and ask the teller how much change they can receive, for various international currencies, for 41 American cents, ranging from the smallest to the largest coins distinguishing the lowest and highest in value among various international currencies. The students can also ask how many coins each international currency has; what is the lowest value of paper currency of each country, etc.

Students could also ask the bank manager which is best for American people, the American economy, and America as a super power, a weak dollar or a strong dollar among the international currency, and why. Finally, students might synthesize all their findings into a written report that includes their own concerns regarding "their" countries' role in the international market as evidenced by the exchange rate and their own research.

Activity 4
Where Does the Metal Come From?

Ask students to find out what kind of metal or metals each coin is made of and list them. Then ask them to locate these metals in the periodic table and to write their physical and chemical properties. Finally, ask them to find out which of these elements are found in the USA and which (if any), we import from outside. Students' reports should include the current price of these elements on the stock market, and where the imported metals come from. See table one for the U.S.A. coin compositions.

Activity 5: Coins Throughout History

Ask students to answer the following questions: When and where did the United States first mint its coin currency? Which coin was minted first and from what kind of metal? What was printed on the two faces of the first coin made in the USA. Do these prints still exist? List the names of all the people whose likenesses are on today's most common U.S. coins (Susan B. Anthony $1.00, John F. Kennedy $.50, George Washington $.25, Franklin D. Roosevelt $.10, Thomas Jefferson $.05, and Abraham Lincoln $.01). They could then answer the following questions: Were all these people presidents of the United States? If not who were they? Why were these people chosen to be on a coin? Who would you choose and why?

LANGUAGE ARTS

Activity 1: Art Research

1.Ask students to do research to find out who the artists were who did the art work on various US. coins.

Activity 2: Writing Prompts

Use the idea of "41 cents" as a story-starter. You might want to cut out magazine pictures filled with lots of activity and ask the students to write a story about forty-one cents (U.S. or international) based on that picture. The idea of "41 cents" could also correlate to the study of various historical periods and their methods and standards of living.

Another interesting activity is that the teacher writes a short story that deals with money, and includes 41 grammatical and spelling mistakes. The teacher gives the story to the students and asks then to discover and correct the mistakes. The teacher lets them know that there are 41 mistakes and they will be given one penny for discovering and correcting each mistake.

Activity 3: Art Drawing and/or Painting:

1. Ask the students to draw the four coins, one on each corner of an 8" x 11 sheet of paper. Then, have the student draw something that encompasses all four coins.
2. Ask the students to draw the four coins in the center of 8" x 11 sheet of paper (in a square form). Then, have the student draw something that encompasses all four coins.
3. Ask the students to draw the four coins in a vertical line on an 8" x 11 sheet of paper. Then, have the student draw something that encompasses all four coins.
4. Ask the students to draw the four coins in a horizontal line on an 8" x 11 sheet of paper. Then, have the student draw something that encompasses all four coins.
5. Ask students to draw the four coins, each on the middle of each side of an 8" x 11 sheet of paper. These four circles will form a rhombus shape. Have the student draw something that encompasses all four coins.
6. Ask students to draw the four coins, one on the middle of the top of the page, and the remaining three in a line on the bottom of the page. These four circles will form a triangle shape covering the whole page. Have the student draw something that encompasses all four coins.
7. Ask students to draw the four coins in a triangular shape in the center of an 8" x 11 sheet of paper. Then, have the student draw something that encompasses all four coins.

Conclusion

Ultimately, the various applications of the concepts introduced either directly or indirectly by "41 cents" can be effectively utilized by instructors from a variety of academic disciplines in order to facilitate the students' mastery of these challenging concepts.

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Appendix B
The Approximate Circular Area of Different Coins.

1. Penny

r= 10 mm => Area = (3.14) $(10)^2$ mm^2 = 314 mm^2.

Therefore 41 pennies cover total area on the plane equal to 12,874 mm^2 = 128.74 cm^2 (counting only the area of one circle corresponding to each coin)

2. Nickel

r= 10 mm => Area = (3.14) $(9)_2$ mm^2 = 254.34 mm^2.

Therefore 41 Nickels cover total area on the plane equal to 10,427.94 mm^2 = 104.42794 cm^2.

3. Dime

r= 8.5 mm => Area = (3.14) $(8.5)^2$ = 226.87 mm^2.

Therefore 41 Dimes cover 9301.465 mm^2 = 93.01465 cm^2.

4. Quarter

r = 12 mm => Area = (3.14) $(12)^2$ mm^2 = 452.16 mm^2.

Therefore 41 Quarters cover 18,538.56 mm^2 = 185.3856 cm^2

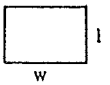
Appendix C
Area Formulas

Area describes the space inside a region. Following are the formulas for several figures.

Square: Multiply the length of one side by another.

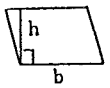
$A = s^2$

Rectangle: Multiply length by width.



$A = lw$

Parallelogram: Multiply the length of the base by the height.

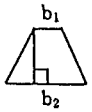


$A = bh$

Triangle: Multiply the length of the base by the height, then divide by 2.

$A = \frac{bh}{2}$

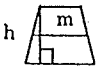
Trapezoid: Add the lengths of the parallel bases, multiply this sum by the height, and divide the product by 2.



$A = \frac{(b_1 + b_2)h}{2}$

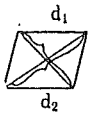
or

Multiply the height by the length of the median. The median is parallel to its bases and equals one-half the sum of the bases.



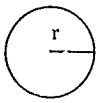
$A = mh$

Rhombus: Multiply the lengths of the diagonals, then divide by 2.



$A = \frac{d_1 \cdot d_2}{2}$

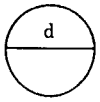
Circle: Square the length of the radius and multiply by π. $\pi \approx 3.14$ or $\frac{22}{7}$.



$A = \pi r^2$

or

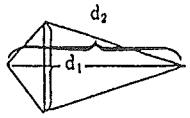
Divide the length of the diameter by 2, square the quotient, and multiply by π.



$A = \pi\left(\frac{d}{2}\right)^2$

Area of a Kite:

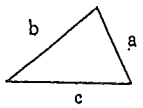
- Find the product of lengths of the diagonals.
- Divide by 2.



$A = \frac{d_1 d_2}{2}$

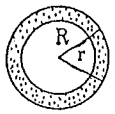
Area of a Triangle Using Heron's Formula:

- Let $s = \frac{a + b + c}{2}$
- $A = \sqrt{s(s - a)(s - b)(s - c)}$



Area of the Annulus—the area between concentric circles:

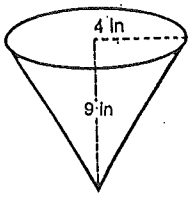
- Square the larger radius.
- Square the smaller radius.
- Subtract.
- Multiply by π.



$A = (R^2 - r^2)\pi$

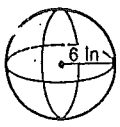
Appendix D
Volume Formulas

Cone: $V = \frac{1}{3}\pi r^2 h$



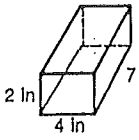
$V = \frac{1}{3} \times 3.14 \times (4 \text{ in})^2 \times 9 \text{ in}$
$= 3.14 \times 16 \text{ sq in} \times 3 \text{ in}$
$= 150.72 \text{ cu in}$

Sphere: $V = \frac{4}{3}\pi r^3$



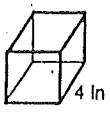
$V = \frac{4}{3}(3.14)(6 \text{ in})^3$
$= \frac{4}{3} \times 3.14 \times 216 \text{ cu in}$
$= 904.32 \text{ cu in}$

Rectangular Solid: $V = lwh$



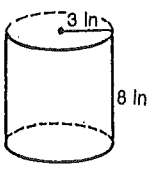
$V = 2 \text{ in} \times 4 \text{ in} \times 7 \text{ in}$
$= 56 \text{ cu in}$

Cube: $V = s \times s \times s = s^3$

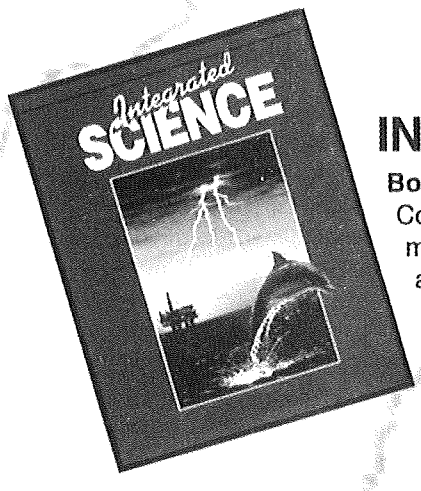


$V = 4 \text{ in} \times 4 \text{ in} \times 4 \text{ in}$
$= 64 \text{ cu in}$

Cylinder: $V = \pi r^2 h$



$V = 3.14 \times (3 \text{ in})^2 \times 8 \text{ in}$
$= 3.14 \times 9 \text{ sq in} \times (8 \text{ in})$
$= 226.08 \text{ cu in}$



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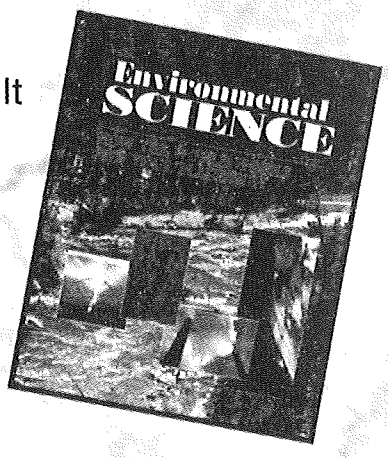

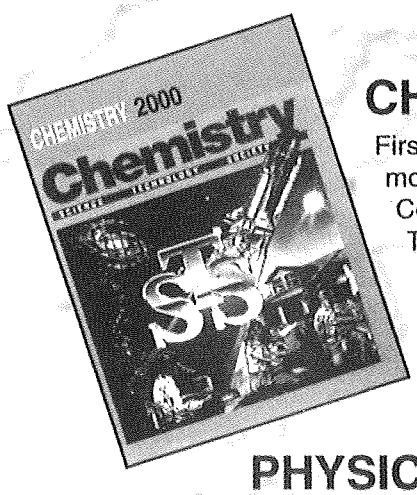

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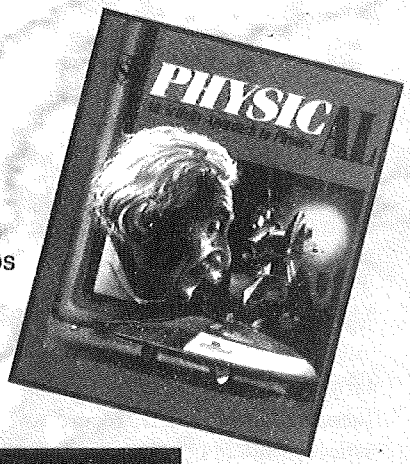

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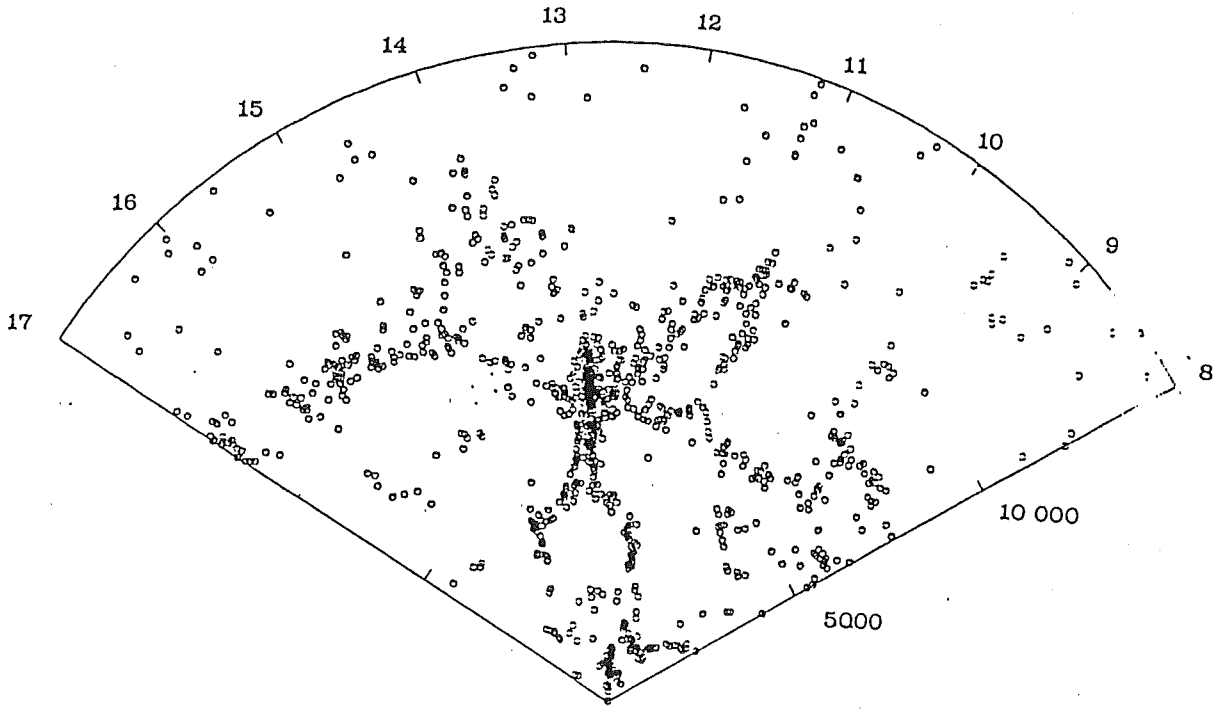
A UNIVERSE OF BUBBLES

In 1983 Margaret Geller and John Huchra of the Harvard Smithsonian Center of Astrophysics planned a research project to map the large scale structure of the universe. Several maps of the universe have been made in the past. Over one million galaxies have been located, but they were in two dimensional space. Geller and Huchra set out to map the universe in three dimensions. It takes six months to measure all of the bright galaxies in one strip of the sky extending out to about 450 million light years. Since 1983, the team has mapped 15 slices of the universe. Their goal is to map all of the bright galaxies in our corner of the universe.

In 1986 the first slice of the universe produced some very surprising results. Prior to that first image the galaxies were thought to be uniformly distributed in space. The new view showed unexpected patterns. A "Stickman", with bowed legs and long arms, stared at the astronomers. Huchra went back to the Mt. Hopkins Observatory to recheck his measurements. However the data were correct. The universe is lumpy. The galaxies form large arching sheets with vast empty spaces inside. There is a "Great Wall" of galaxies extending across the survey. The patterns form bubbles of galaxies when several slices are added.

The map of the first slice of the universe. Courtesy Harvard-Smithsonian Center for Astrophysics.



Dr. Geller used the analogy of soap bubbles, the galaxies are the film on the edge of huge bubbles in space. The patterns are limited by the scope of the survey. The largest patterns may still not be visible. Even now several projects are underway to increase the amount of data available, to look for larger patterns. How did the galaxies get to be arranged in these patterns? Scientists don't know the answer to this or several other questions that have arisen as a result of the data. We do know the information well enough though that we can begin to find our address in the universe.

The activities that follow take a constructivist point of view. Students are not told in advance that they are studying the large scale structure of the universe. They will figure it out themselves. Students are presented with a series of problems and bits of information. By recording information about bubbles, a bar code scan of a planet in the future, a map of the earth and videos, students can recreate some of the problems faced by scientists as they try to make inferences from the data they uncover. The culminating activity is a comparison of student results with that of Geller and Huchra via two videotapes.

The first shown is a segment from "The Infinite Voyage: Unseen Worlds." It depicts the results of the work of the two scientists. Students can make a direct comparison of the data from their observations, the reconstruction and mathematical treatments of thin slices of bubbles, to the large scale structure of the universe. The second video, "So Many Galaxies...So Little Time," depicts the underlying work of Dr. Geller and her graduate students as they unravel the structure of the universe.

Activity 1. Bubbles.

The Lawrence Hall of Science introduced its book "Bubble-ology" in 1986. One of the activities has students measure the diameter of bubbles. The surface area and volume of a bubble dome can also be calculated. Students blow and draw "Baby Bubbles" (for later use) and have a "Big Bubble" contest.

Directions: The surface of your table should be wet with bubble solution. Make sure your table is level. If the table is not level the soap solution will run off. Get the end of a straw wet with soap solution. Hold the straw directly vertical to the table top and the end of the straw should be touching the soap solution. Blow gently to form a bubble.

Part 1. Baby bubbles.

Make 5 to 7 small bubbles of different sizes. Make sure the bubbles are touching each other in a roughly circular pattern. Measure the diameter of the baby bubbles with your ruler. Measure your drawing, be as exact as possible. Draw the outline of the pattern the bubbles make on the table in your notebook.

Part 2. Big bubbles. Prizes for the winners!

Follow the directions above but this time try to make as big a bubble as possible.
Data: On the lines below record the diameter of the three largest bubbles you made.

1. _____ 2. _____ 3. _____

What is the average diameter of your bubble? _____

What is the average radius of your bubbles? _____

What is the volume of each of the bubbles?

1. _____ 2. _____ 3. _____

What formula did you use to calculate the volume? _____

Activity 2: Bar coding a Planet

Imagine the year is 2768. A unmanned satellite using controlled fusion thrusters surveys a distant solar system around 51 Pegasi. As the satellite zooms past a planet it records a strip of information in the form of a bar code scan and radios the information back to earth. What kind of inferences can be made from the scan?

The scale is 1cm = 5000km. Black = Solid White = liquid.

	Formula Used
_____circumference	_____
_____diameter	_____
_____radius	_____
_____area	_____
_____volume	_____

Planetary details:

_____Calculate the area in black. _____ Percent black

_____Calculate the area in white. _____ Percent white

_____Calculate the area mapped. _____ Percent mapped

Predict what the rest of the planet will look like.

Have students work in teams to determine and calculate what information can be deduced from the scan. When they finish, review the information. Only after they have made suggestions on what they consider possible to infer, have them fill out the preceding information on a work sheet. Calculate the actual dimensions of the planet and the formula used to calculate your answer.

Activity 3. A Strip of Planet Earth

In a presentation made at the 1992 NSTA convention in Boston, Dr. Geller compared her map of the galaxies to that of a slice of earth. She cut a map into a strip and explained the relationships between the strip of the planet and the map of the galaxies. The area of the galaxies mapped so far would correspond to the state of Rhode Island compared to the surface of the earth. She noted a very important difference between areas sampled. A square and a rectangle may have the same area but yield very different information. If one cuts out a square portion of the earth it would be most likely to contain only water with a 30 percent chance of land. A narrow strip that circles the globe would give the interpreter a small sample of almost everything on the planet.

Find some unneeded maps of the earth. Cut them into thin strips about 3cm wide. They don't have to be parallel to the equator. Have students find all the possible bits of information of the strip of the planet they have. Combine groups and have students share the information. From just a strip, students can find oceans, lakes, rivers, mountains, glaciers and deserts. Combining groups is like having more strips of the universe. The more data the accurate our predictions can be. Students can make comparisons between the bar coded planet and a strip of the earth.

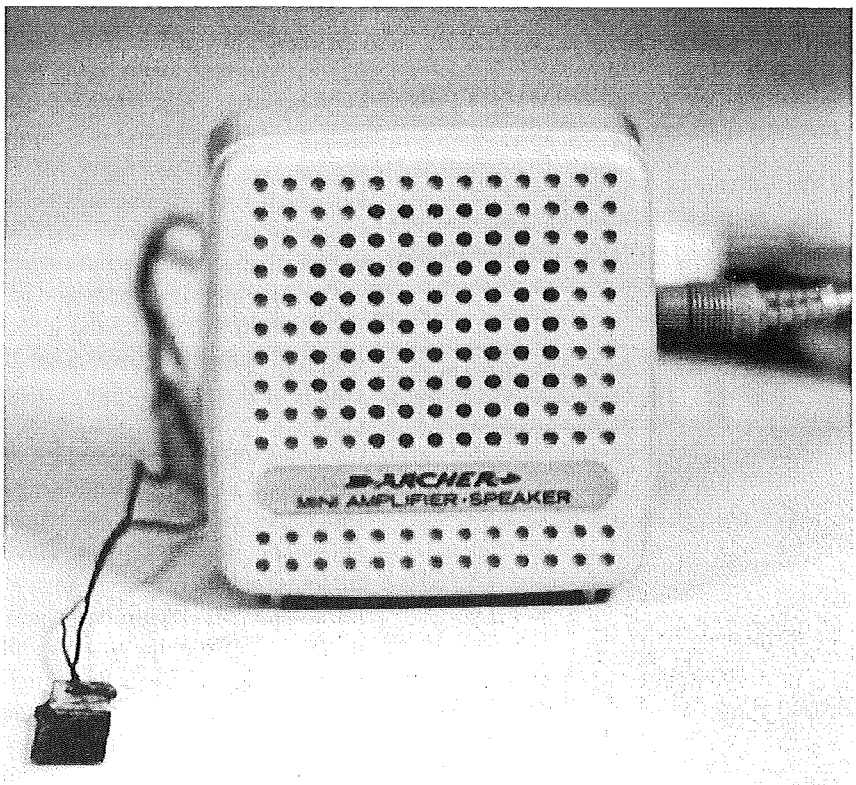
Harry Manos
Schurr High School
Montebello, California, 90640

INFRARED: HEARING AND SEEING IS BELIEVING

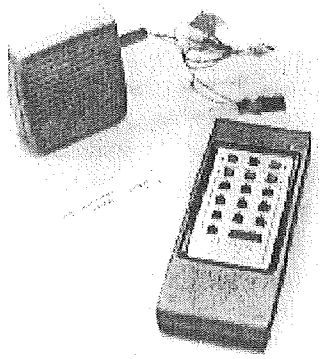
In astronomy and optics, science teachers are expected to teach about the invisible spectrum. When it comes to the infrared we can make vague references to heat radiation reaching us from the sun through infrared electromagnetic waves and to heat lamps in bathrooms that warm us when we step out of the shower, but students are always curious to know, "If it's invisible, how do we know it's there?"

A simple demonstration can be purchased and assembled for about $20 with Radio Shack parts to answer this question. I first saw this demonstration done by the Stray Cats, a group of highly motivated high school physics teachers from Nagoya, Japan, who have devoted themselves to developing demonstration and laboratory equipment in all areas of physics. Ironically, the most expensive item is readily available and essentially free, a television remote control.

Both television and VCR remote controls send signals using infrared wavelengths of the spectrum. Point a remote control at a wall and press a button you see nothing. Point it at your hand and press a button you feel nothing, not even heat from that part of the spectrum known for transmitting heat. But aim it at a television or VCR and, like magic, things happen: volume changes, channels are switched, a video tape plays, and the list of things a remote control can do seems endless.



A solar cell which is connected to a portable amplifier making the infrared signal audible.

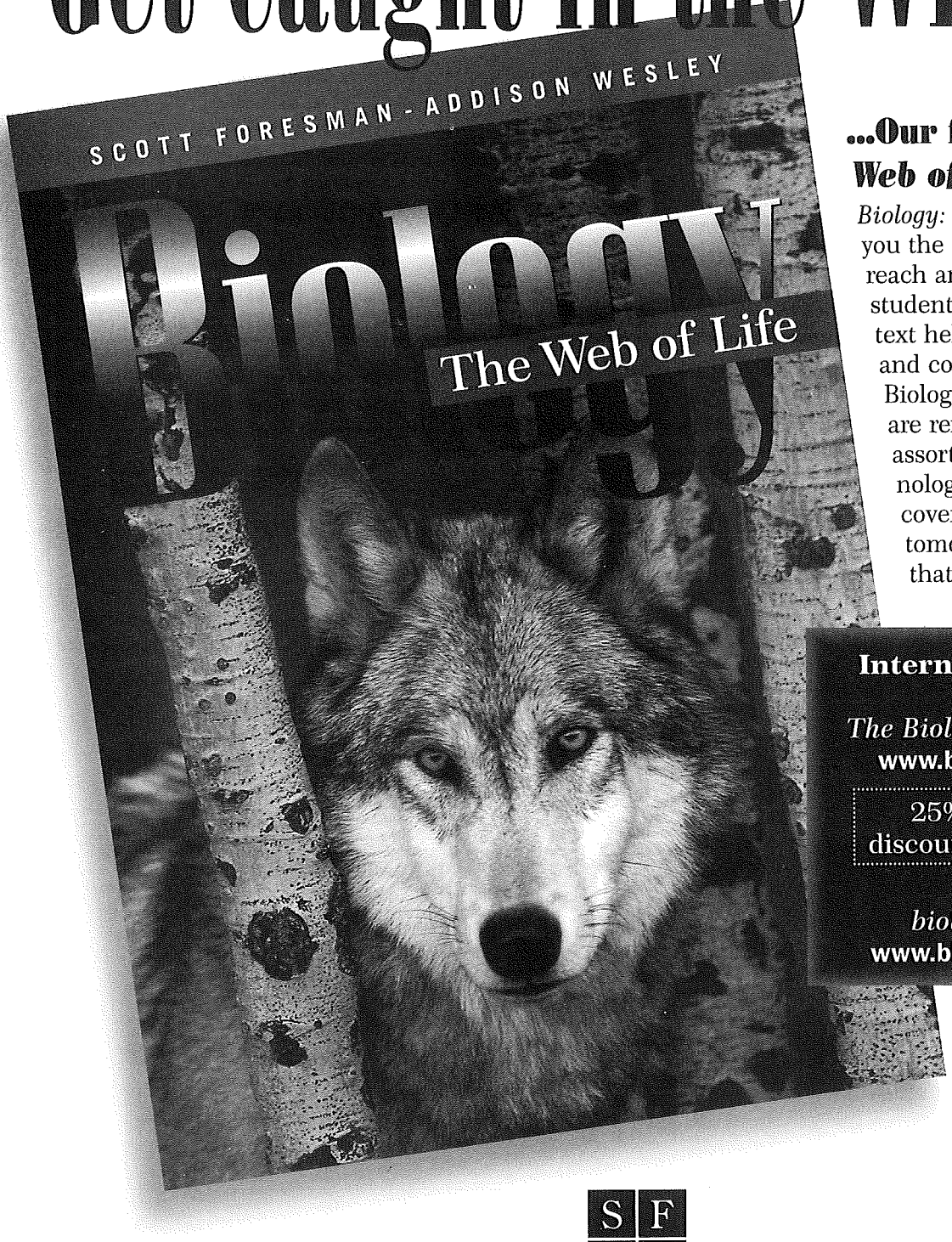


This invisible signal can be made to be heard. Simple off-the-shelf Radio Shack parts will do the job. Use a silicon solar cell that is sensitive to the infrared (stock #276-124A), a portable, pocket sized amplifier (stock#277-1008c), and a jack to connect the solar cell to the amplifier (#274-289). The amplifier operates with a 9 volt radio battery. Wire the solar cell to the jack then plug it into the input of the amplifier (see the photo). The solar cell in the photo is not a Radio Shack solar cell, but I have wired and tested the Radio Shack silicon solar cell and it works just fine.

Simply turning on the amplifier with the solar cell under a lamp or in an artificially lighted room will be a sufficient test of the circuit because there will be a hum from the lights. Block the solar cell with your hand and when the hum goes away you know the device is ready. Next, darken the room and aim a remote control at the solar cell and press one of the buttons. The sound you will hear is from the infrared signal from the remote control. The signal usually sounds like the subdued ringing of a telephone. Pressing different buttons one after another will give the different signals for the buttons pressed. Making this demonstration can even be assigned as a student project.

The demonstration of the infrared is interesting and within the scope of students' experiences. The demonstration shows how we can have action at a distance using electromagnetic waves -- in this case infrared waves. The demonstration also gives unambiguous evidence of the presence of infrared and answers the question of how we can know the infrared is there even though we cannot see it.

Get Caught in the WEB...



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Dr. Kim Pittman
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THE DISCOVERED WORLD

Have you ever imagined creating your own Dinosaur Park, Triassic Park, Jurassic Park, Cretaceous Park or Mesozoic Park? Biology students at Springman Junior High did just that. They were researching, classifying and creating multimedia parks that were scientifically valid ecosystems.

Dinosaur Park is an enjoyable, multicurricular activity that integrates technology, biology, earth science, language arts and mathematics. This project was an on-going project that lasted about six weeks throughout the duration of the unit on Heredity/Genetics. The primary objective of the activity was for the students to apply and integrate what they learned about classification, food webs, and paleontology to the creation of an scientifically sound ecosystem. A secondary objective was for students to utilize technology and a multimedia approach in a performance-based assessment. The students were concurrently reading and discussing portions of the book, *Jurassic Park* and *The Lost World.* The students were expected to take the book one step further and imagine a fictitious island or park that wouldn't have the same problems that *Jurrasic Park* and *The Lost World* experienced.

Dino Hunters

To obtain information about dinosaurs, the students accessed national websites: **http://www.scope-tech.com, htpp://www.cup.org/Titles,** CD-Roms: Grolier *Prehistoria* and *Dinosaurs* by Microsoft. In addition, many students consulted other library sources. The students researched at least ten dinosaurs for habitat, diet, behavior, size, other characteristics, and climatic conditions necessary for the dinosaurs to survive. At least ten dinosaurs are necessary to allow for critical thinking on the classification decisions of the students. They had to decide on a particular period of time that they were interested in (i.e., Cretaceous), see Figure 1. In addition, the students had to calculate the amount of area an animal would need to survive, the type and amount of food, and the carrying capacities of the animals. The students also examined various extinction theories to gain a better understanding of survival rates of the animals.

Once the research was collected, the students had to conceptualize 'The Park'. Taking all of the above conditions and requirements into consideration, the students had to classify the animals according to diet (herbivores, carnivores, omnivores) and time on earth (triassic, jurassic, cretaceous). Using this information, they had to create the park based on a classification system that would really work. They had to consider:

* Predator-prey relationships
* Space requirements for each animal
* Water sources
* Geography of the park or island
* Climatic conditions
* Foliage and other fauna
* Containment of the animals
* Diet Restrictions

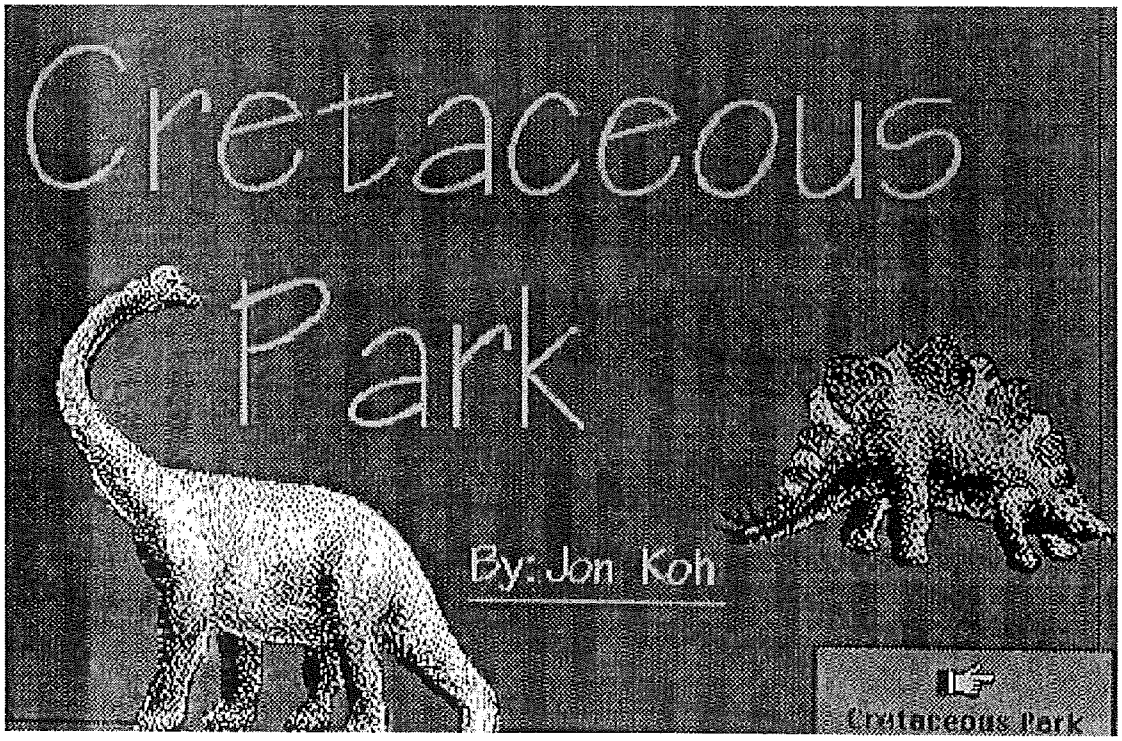
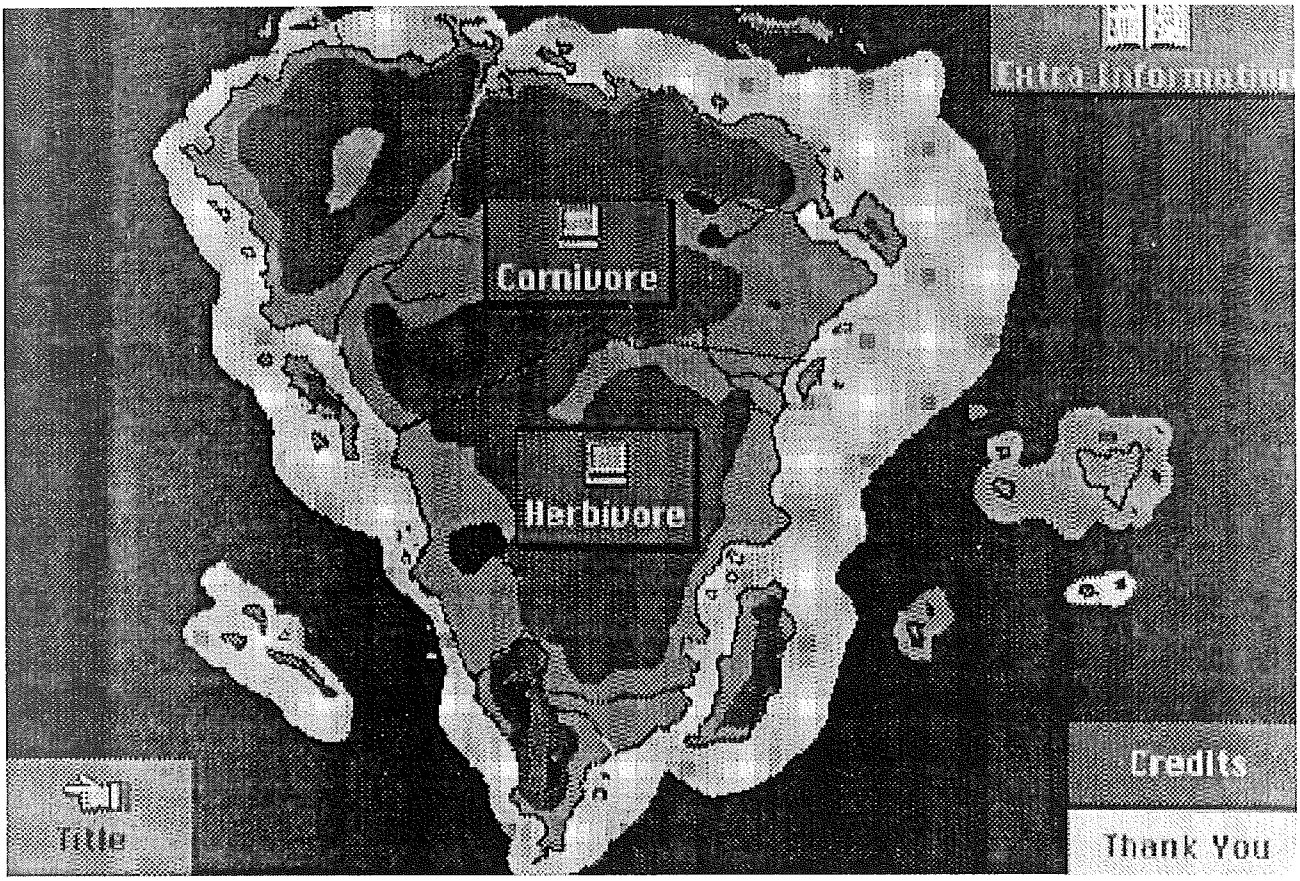


Fig. 1



Multimedia Park

After the students had completed the research and conceptualized their park design, they were ready to start creating their park on the computers. Two software programs can be used with this project: *Hyperstudio* or *Hypercard.* I used *Hyperstudio* because it offered more special effects and the students had some prior experience in the program before I started this project. The students were taught the basics of the program (i.e., creating a new card, creating a button, making links between cards, adding text and adding clip art) during one class period. The students then got started and learned what they needed as they advanced through the project, using a *Hyperstudio* Basic Skills packet (that I provided) and other students with advanced technology skills during science class for the first week of the project. After the first week, students worked during class in other subjects, afterschool or during lunch. This project allowed each student to work at their level and at their pace. Students with more technology experience were imported video clips and videodisc images into their project; however, it was not a requirement of the project. The multimedia requirements of the project were (but not limited to):

* Must contain a Title Card (title of park, and your name)
* At least 10 dinosaurs (for classification purposes)
* At least 4 textboxes (fields)
* Include an "End" card that has a button to the map
* At least 2 scanned photographs
* At least one hand-drawn graphic
* At least 1 animation
* Incorporate clip art from CDRoms, etc. on all dinosaurs
* Each card must have at least 1 button that takes the viewer to another card.
* At least 2 buttons with an ICON (pictures)
* At least 3 buttons with SOUND
* At least 5 buttons with VISUAL EFFECTS
* Reference/Bibliography Card
* Optional: Include videodisc/movie segments.
* Optional: Roll the Credits

Because of the complexity of the project, this project requires a lot of computer memory. I do not recommend that students save their work on their own disks. To avoid computer saving errors, I assigned each student a password to work off a server. There were fewer problems (i.e., saving errors, loosing work, etc.) when the students worked off the server.

The students were assessed on the authenticity of their research and classification/design of the park and on their technical skills (see above). Some students are planning on sharing their creations on the internet.

NATIONAL GEOGRAPHIC SOCIETY

1145 17th Street N.W.
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On the Web with National Geographic

Hop onto the Internet for some exciting online features at the National Geographic Web site. The National Geographic Society is redesigning its entire Web site to make navigating around it much easier than before. You won't be disappointed with your discoveries online.
Find us at **www.nationalgeographic.com.**

• Tornadoes. The newest item that will captivate students zeroes in on tornadoes. They can join "tornado chasers," meteorologists who use satellite data and Doppler radar to track twisters on their illusive and deadly paths. Dramatic images will illustrate why it's crucial to sound the alarm in time for people to take shelter.

• Tarantulas. And if you thought tornadoes were hairy, try tarantulas! A new feature builds on the September 1996 NATIONAL GEOGRAPHIC article on these large spiders. Students can watch a tarantula snare its prey and follow the spider into its den. Teachers will find activities on tarantula anatomy and topics for discussion regarding tales about these spiders, covering both myth and reality.

• Yellowstone. Kids can also journey to Yellowstone National Park to see and hear its geysers, mud pots, and other geothermal wonders. They can plumb the depths of the Grand Prismatic Spring, probing deep beneath the boiling pool to discover groundwater passages, the ash from ancient volcanoes, and the vast chamber of magma that underlies the park.

Rebeca Santana
Reprinted from *California Classroom Science*

Cool Science Web Sites

Exploring Planets in The CLASSROOM - Hands-on Activities
http://www.soest.hawaii. edu/SPACEGRANT/class_acts/
More than 25 hands-on activities for teachers and students to explore geology, Earth, the planets, and space sciences. Click on "Planetary Properties," "Impact Craters," "Volcanology," or "Remote Sensing" where one can simulate by hand how a computer processes digital images into color pictures and to learn how a planetary geoscientist interprets these pictures. Scroll down to find "PSR (Planetary Science Research) Discoveries" site for education, planetary and space sciences, and for learning how science works.

Dr. Internet
http://www.ipl.org/youth/ DrInternet/
The Dr. Internet web site informs, educates and entertains youngsters about math and science. "Dr. Internet's Science Projects" are easy to follow because of simple, clear instructions and photos of each step. "Explore the Internet with Dr. I." contains seven related earth science sublinks: "Earthquakes," Volcanoes," "Environment," "Weather," "Pictures from Space," and "Cool Links." "Science Fair Project Resource Guide" contains ideas, samples, magazines, and resources on science fair projects. Scroll down to find more sublinks to motivate and support students to participate in science fairs.

The Jason Project
http://www.jasonproject.org/
This interactive telecommunications web site enables students and teachers to take part in global explorations. Click on any of their sublinks, such as "Student Explor-A-Zone" where students can share their ideas with other students, or "Teacher's Guide" which lists so many informative and resourceful sublinks.

The Looney Bin
http://www.geocities.com/Athens/3843
This site is dedicated to "good grades and not-so-good grades." Sublinks are "Are You a Good Student Quiz?" and "Improve Your Study Skills." Tips (or sublinks) on passing exams, writing reports and finding out what employers want in the job market are also high lighted. Students can even e-mail their questions or concerns. A web site any student will find helpful.

The Yuckiest Site On the Internet
http://www.nj.com/yucky
Click on "Worm World" where the Worm Reporter gives you the dirt about worms. Or click on "Cockroach World" where Rodney the Roach takes you on a close-to-home or around-the-world journey. Both links contain additional sublinks to explore. Squeamish people, be brave. It's not so bad.

Minnetonka Elementary Science Center
http://www.minnetonka.kl2.mn.us/support/science/
Designed for K-5 teachers. Sublinks include: "Science Enrichment/Lesson Plans," "Teacher Tools," and "Scope & Sequence: What do we teach?" which lists the required and optional elements of K-5 curriculums. This information can help teachers adapt or enhance their science programs.

Larry Wolfe
Reprinted from *California Classroom Science*
May 1997

COMPUTER TEACHNOLOGY SCIENTIFIC SURFING IN NINETY SEVEN OUR BEAKER RUNNETH OVER

Knowledge Network Explorer Home Page
http://www.kn.pacbell.com/
This site is a prime example of what can be accomplished when educators and private industry join forces for the betterment of educational resources and technology. Pacific Bell has formed a partnership with San Diego State University to develop Internet and video conferencing applications for K-to-12 classrooms, community colleges, and public libraries. A must see for educators at all levels.

Arrachoir Scientist
http://www.areacom.it/html/ita/loris/armchair.html
The Armchair Scientist, an electronic magazine (e-zine) still in its infancy, seeks to fully utilize the advantages of the Internet in order to create "a new way of doing science." Basically, this site is a mini *Scientific American* with a much homier and less intimidating ambiance. Filled with a number of easy-to-understand articles from a number of fields, the Armchair Scientist has much to offer. The Science Show portion of the site is particularly fascinating, as it reports snippets of scientific news and discoveries from across the Web. The aims of the project seem admirable, so drop by and let the scientist know what you think.

Fusion Power
http://www.fusion.org.uk
A limitless and ecologically responsible source of power, fusion has been the dream of those in the energy business. What's the catch? Well, on Earth the reaction needs to take place at around 100,000,000 degrees Celcius, making confinement a sticky business. The U.K. Atomic Energy Authority has been charged with handling much of the necessary R&D, as well as dealing with the fission-based nuclear sites already in existence. Its Web site provides a thorough education about fusion for the lay person and expert alike, and furnishes extensive details about ongoing fusion research. Drop by this surprisingly attractive site for a quickie education on the future of fusion.

The Internet Pilot to Physics (TIPTOP)
http://www.tp.umu.se/TIPTOP
The Internet Pilot to Physics is an extremely ambitious undertaking that aims to become a unified physics resource on the WWW.TIPTOP currently offers access to the highly successful PAW (Physics Around the World) database, as well as a number of job listings, chat rooms, conference listings, bulletin boards, etc. Very much a work in progress, the site should soon become a one-stop resource for physics, physics students/ teachers, and anyone interested in physics.

Betsy Martinelli
Steel Recycling Institute
800/876-7274

SRI Links National Database to Website Consumers Can Now Use Internet to Locate Recycling Options

It's now easier than ever for consumers to find recycling locations-online. The Steel Recycling Institute (SRI) and The**Steel**Alliance have joined together to create the first online searchable database of steel recycling locations. The database is available through the SRI website at **www.recycle-steel.org,** or The**Steel**Alliance website at **www.thenewsteel.org.**

We have developed one of the most comprehensive databases for recycling locations available today." said Bill Heenan, president of SRI. "Consumers can now easily access more than 30,000 recycling options for steel cans, appliances, automobiles, construction materials and other types of steel scrap, through the Internet."

The**Steel**Alliance website is featured in a new integrated communications campaign, including print and television advertising, touting the many benefits of steel. "Recyclability is a key message we want to communicate to consumers through this new image campaign. This link to steel recycling information will not only raise awareness, but will also help to divert steel products from landfills back to the steel mills," said Mark Stephenson, executive director of The**Steel**Alliance.

The SRI database is maintained by the Institute's seven regional recycling offices. "Because we have the grassroots contact with local recycling coordinators, we are able to continually update our records, providing consumers with the most accurate information available," Heenan explained.

The database information is also available to consumers via a national hotline, 1-800-YES- 1-CAN (937-1226). More than 200 million Americans have convenient access to steel can recycling through curbside, drop-off and buyback recycling programs, as well as through magnetic separation at resource recovery facilities. There are also more than 7,000 appliance recycling locations and more than 12,000 auto dismantlers and shredders located throughout the United States.

In its efforts to promote and sustain the recycling of all steel products, the Steel Recycling Institute educates the solid waste management industry, government, business and ultimately the consumer about the benefits of steel's infinite recycling cycle. Through its seven regional offices, SRI works with city, county and state recycling coordinators and solid waste managers, recycling operators, intermediate processors and end market buyers to ensure the continuing development of the steel recycling infrastructure.

MIDWEST CONSORTIUM FOR MATHEMATICS AND SCIENCE EDUCATION

Need to find information on math, science, or technology right away? The Midwest Consortium for Mathematics and Science Education's home page provides links to many valuable resources, including the North Central Regional Educational Laboratory home page, *Pathways to School Improvement* server, special sections of MSC's own web site, the Eisenhower National Clearinghouse and other Eisenhower Regional Consortia, and much more. Some of these resources—and where to find them on the Internet—are described below.

The *Pathways to School Improvement* Internet server offers easy-to-find, concise, research-based information on school improvement. This site features articles on timely topics; audio and video segments of students, researchers, and educators in the field; sample worksheets from real classrooms; lists of resources and contacts; and much more. Topics covered on the *Pathways* server include Assessment, At-Risk Children and Youth, Goals and Standards, Governance and Organizational Management, Leadership, Learning, Literacy, Mathematics, Parent and Family Involvement, Professional Development, Safe and Drug-Free Schools, School-toWork Transition, Science, and Technology.

htip ://www.ncrel.org/ncrel/sdrs/ pathways.htm

NCREL

The NCREL home page contains information about the North Central Regional Educational Laboratory—its staff, products, and services. NCREL is a not-for-profit organization that is dedicated to applying research and development to strengthen and support schools and communities in systemic change so that all students achieve standards of educational excellence. NCREL serves a seven-state region, including Illinois, Indiana, Iowa, Michigan, Minnesota, Ohio, and Wisconsin.

http://www.ncrel.org/ncrel/ncrel.html

Learning Through Technology: A Planning and Implementation Guide helps educators and community members develop a comprehensive learning and technology plan. The site is divided into six sections:

1. Planning to Plan
2. Building a Knowledge Base
3. Establishing General Directions
4. Implementation Priorities and Strategies
5. Evaluation
6. Revision for Improvement

http://www.ncrel.org/ncrel/tandl/ tech and learn.html

Systemic Mathematics and Science provides information to educators and community members working to create systemic improvement in mathematics and science education. It is divided into five areas:

- Vision
- Curriculum
- Learning and Instruction
- Assessment
- Changing Perspectives

http://www.ncrel.org/ncrel/mands/mathsci.htm

Other web sites of interest to math and science educators:

- Eisenhower National Clearinghouse

http://www.enc.org/consortia.htm

- Mathematics education

http ://www.ncrel.org/ncrel/msc/ mathweb.htm

- Science education

http ://www.ncrel.org/ncrel/msc/ sciweb.htm

- Integrated mathematics and science education

http ://www.ncrel.org/ncrel/msc/ intweb.htm

What you will need to get the MSC web site

Computer: A color Macintosh or IBM compatible 386 machine with Windows and 8 mb of memory.

Modem: At least 9600 baud (14.4 or greater is even better)

Internet access: A telephone connection and an account giving you access to the World Wide Web are necessary. Both commercial services and publicly funded services through local universities and other institutions can get you connected. Some services now offer special discounts to schools.

Software: Your Internet service provider or your system administrator will specify what programs you need in order to access the World Wide Web.

Have a great trip!

Midwest Consortium for Mathematics and Science Education, a resource for mathematics and science materials

The Midwest Consortium for Mathematics and Science Education (MSC)—operated by the North Central Regional Educational Laboratory (NCREL)—is one of ten consortia for mathematics and science education funded by the U.S. Department of Education under the National Eisenhower Program. MSC serves a seven-state region (Illinois, Indiana, Iowa, Michigan, Minnesota, Ohio, and Wisconsin).

MSC's mission is to advance systemic change in mathematics and science education through (1) collaboration with institutions and agencies within the region; (2) direct services and technical assistance to school districts, schools, teachers, and administrators to support high priority initiatives; (3) support for the development and implementation of standards, curriculum, assessment, and performance indicators that challenge students to higher levels of attainment; (4) identification and dissemination of methods, materials, and practices that expand learning beyond the classroom through informal education agencies and online electronic media and technology; and (5) access to networks of instructional resources and materials that will result in improved learning for all students.

For more information, contact: Gil Valdez, *MSC Director* North Central Regional Educational Laboratory 1900 Spring Road, Suite 300 Oak Brook, Illinois 60521 Phone: (708) 571-4700

OTHER SITES OF INTEREST

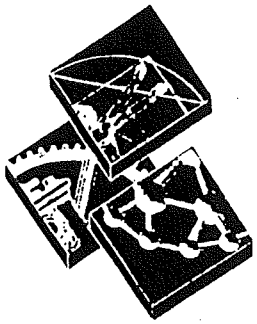
National Middle Level Science Teachers Association
http://www.nsta.org.nmlsta

Free and inexpensive online resources for public schools
www.isbe.state.il.us

Scholastic Network's one year contract allows every public elementary and middle school to receive FREE Scholastic Network building-wide site license or individual use account for 12 months
http://scholasticnetwork.com/illinois/index/htm

The Illinois State Board of Education is subsidizing the purchase of Britannica Online for all public schools in Illinois. Through this special offer, schools may purchase BOL for only $0.125 per student. which is less than 10% of normal school cost. For more information contact Frank Morelli at 800-621-3900 ext. 6510 or e-mail fmorelli@eb.com

OPPORTUNITIES



ANNUAL ENGINEERS WEEK

CONTACT: Don Wittmer (312) 930-9119

Todd Vanderwater (312) 3683849
Doug Ritzmann (312) 368-3556

In conjunction with NATIONAL ENGINEERS WEEKr (NEW), Chicago engineering societies are hosting a student design competition in area schools. The contest, known as the "Future City TM Competition"" will require middle school students with the assistance of an engineer mentor, to design a future city with the aid of the award winning computer software, SimCity 2000 TM and the "Urban Renewal Kit" add-on software developed by Maxis.

This year's event will be sponsored by Fluor-Daniel. Additional support is provided by the American Society of Civil Engineers, Structural Engineers Association of Illinois and HNTB Corporation. Funding has been generously provided by Fluor-Daniel and the Illinois Engineers Week Committee.

This program has been developed by engineers to provide much needed technological education to the students. Communications director Bob Johnson states, "Few if any schools are providing education in applied science (read engineering), This program is an opportunity to understand the creative as well as the practical side of science and math." Locally, the regional competition will take place January 17, 1998 at the University of Illinois at Chicago. Winners of the local competition will advance to the final judging in Washington, DC., during NATIONAL ENGINEERS WEEKr, February 22-28,1998. The winning teams will receive grants and prizes for their school and team members and the top local teams will be feted at the annual Engineers Week - Chicago luncheon scheduled during Engineers Week.

Last year's winning team, Pleasantdale Middle School, Burr Ridge, received a trip to Washington, DC to compete in the national finals. All teams from 1997 regional judging received gifts courtesy of the ENGINEERS WEEK - Chicago Committee and local engineering firms. The first through fifth place teams were recognized at the annual Engineers Week Chicago luncheon, February 1997.

Since 1951, NATIONAL ENGINEERS WEEK, has been the nationwide celebration of the engineering profession, to acknowledge the essential role engineering has played in advancing civilization and adding quality to our lives. In Chicago, activities scheduled include engineering lectures, student outreach efforts, bridge building competitions and exhibitions of engineering achievements. The Poster-Essay competition for 3rd - 8th grade students also continues. Contact Deb Zroka at 1-773- 935-6376 to request detailed information.

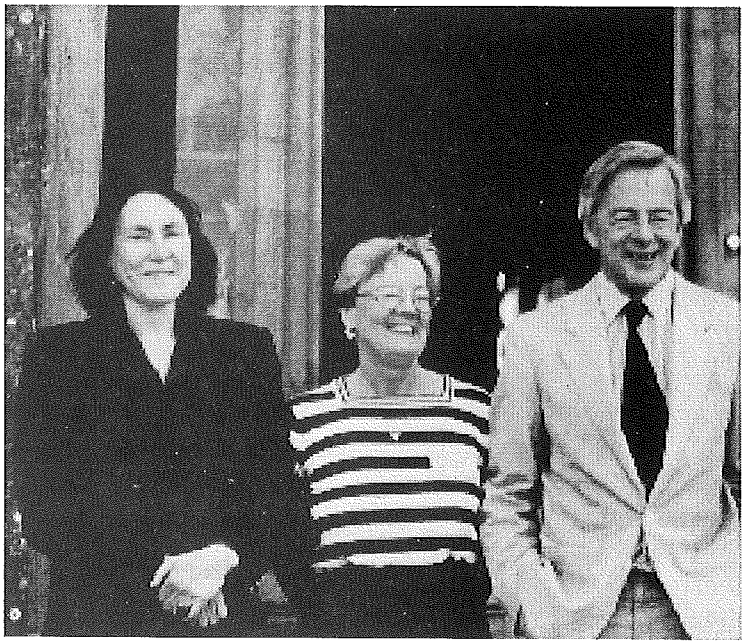
HISTORY OF SCIENCE TOUR — JUNE 1998

A custom designed tour to visit places of interest to Science teachers is being planned by Yvonne Twomey and Lee Marek and will take place during second half of June, 1998. Graduate credit will be available at a modest extra cost. If you are interested in receiving further information once the details of the trip are finalized, please contact
Yvonne Twomey, 841 Kinston Court, Naperville, IL 60540
Tel: 630-961-9811 Fax: 630-961-0495
or Lee Marek at LMarek@aol.com

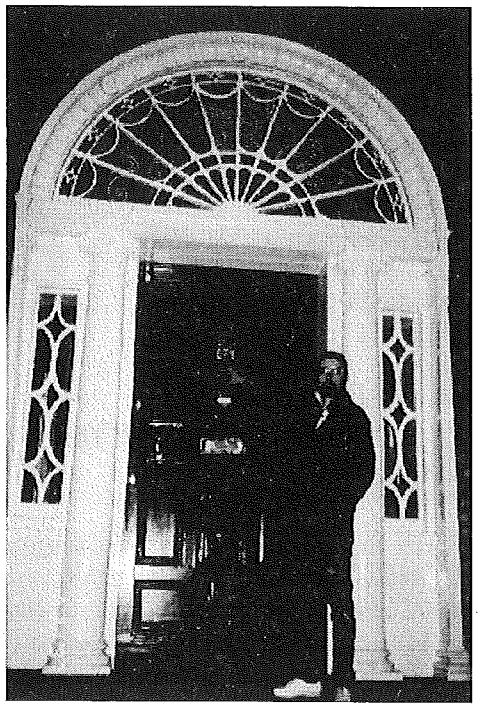
The details of the itinerary are not yet available, but there will be visits in Ireland, Wales and England. We shall include some of the most interesting sites visited during the very successful tour of Ireland and England run by Yvonne and Lee during June 1997. Lectures by specialists will be provided at appropriate places.. The visits will be set into the historical and cultural background of the countries and will include opportunities for archeological, artistic and cultural experiences.

Accommodation will be comfortable' with single, double and larger rooms available. Price will be based on double occupancy. All accommodations, breakfasts' many other meals, surface transportation by luxury coach, lectures, and entrance fees will be included. The duration of the trip will be 16 days. For those who wish to spend time in London at the end of the organised tour, this can easily be arranged. Inexperienced international travellers will be given much help.

Cost of the upcoming trip is not yet available, but should compare with 1997 (voted "excellent value for money" by this years participants). This worked out at below $3000 per person including transatlantic air-fare. Info. will be mailed as soon as available. Travelling companions (or non-scientists) are welcome.



Mrs. Yvonne Twomey pictured with Lord and Lady Rosse after a luncheon for the History of Science group in the magnificent dining hall at their home, Birr Castle. Upper right, Lee Marek outside the house in Merrion Square, Dublin, where Erwin Shroedinger lived and worked 1940-1956.



THE NATIONAL GARDENING ASSOCIATION is pleased to announce that applications for its 15th annual **Youth Garden Grants Program** are available. NGA, a member-supported non-profit organization based in Burlington, Vermont, will award 300 grants to schools and youth programs nationwide for use during the 1998 growing season.

Each grant, worth more than $700, consists of quality tools, seeds, plants and garden products contributed by Ames Lawn & Garden Tools and 27 leading companies from the lawn and garden industry.

Gardening programs involving at least 15 children between the ages of 3-18 years are eligible, with consideration given for educational, social, or environmental programming; sustainability; community support; strong leadership; need, and innovation.

To receive an application, access the Worldwide website at **www.garden.org** or write to Garden Grants Dept. PS, National Gardening Association, 180 Flynn Ave., Burlington, VT 05401. Or call 1-800-538-7476. Include the following information: name, title, school or organization, address and phone number.
Deadline for application: November 15

ILLINOIS NURSERYMEN'S ASSOCIATION

Kristen Hale
Illinois Nurserymen's Association
1717 S. Fifth St.
Springfield, IL 62703
217-525-6222

INA PREPARES TO LAUNCH NEW AG./HORT. PROGRAM

Over the last ten months, a dedicated committee of twenty individuals has been busy creating an apprenticeship program aimed at getting high school students interested in green industry careers. The committee is made up of Illinois Nurserymen Association members and staff, high school and community college educators, as well as representatives from the Illinois State Board of Education. Those involved have spent countless hours deciding upon the specifics of the program. Some committee members have spoken at various educational conferences informing students and educators about the program. Informational brochures, folders and a video have also been created by the committee. Packets of these information pieces have been mailed to high schools throughout the state. The information will be kept in the schools' counselors offices so that students and their parents will have unlimited access to it. The Apprenticeship Program is scheduled to begin in September of this year.

The idea for this program came about a few years ago when a high school principal and the owner of a wholesale container operation were discussing ways to get students involved in horticulture. Peter Orum, owner of Midwest Groundcovers in St. Charles, told Somonauk High School principal, Glenn Posmer, of his experiences in the Danish apprenticeship system. Glenn, impressed by what he heard, thought such a program would work well here.

And so, after a few years of tossing ideas around and expanding on those ideas, the Green Industry Apprenticeship Program has come to be. It is a mixture of the European-style system and the American college internship program.

The program is a five year endeavor which begins in students' junior year of high school. Students wishing to participate in the program must meet tough guidelines before being accepted. This insures that those involved in the program are dedicated to pursuing a green industry career.

In the junior year students will take several job shadowing trips to a nursery or landscaping company. They will learn what goes on at these businesses by helping employees perform their day-to-day responsibilities. Students will continue with their job shadowing during the first semester of their senior year. In the spring semester, they will begin working for a nursery or landscaper for part of the school day. Students will receive a wage and graduation credits for this work. They will be performing tasks which are required by full-time employees everyday. Doing this will help prepare students for the realities of working in the green industry and help to determine if they are seriously committed to a green industry career. If students desire to continue in the program for the remaining three years and are accepted to participate, they will work at a nursery or landscape company in exchange for a wage and community college tuition. The tuition is to be used towards achieving an agriculture or horticulture associates degree. Students will be given a list of current industry-based skill standards of which they will be guaranteed to learn by the end of the program. The skills will be listed on a journeyman's certificate to be presented to the student at the program's end by the Illinois Nurserymen's Association.

Once the five year program is completed, students should have a better understanding and deeper respect for what goes on inside a green industry company. He/She will have learned a variety of skills during their hands-on training, and, with their associate's degree, will be on their way to a successful career. As for the host nurseries and landscapers, they will gain a valuable, responsible and loyal employee.

This program is designed to benefit all of those involved. It is a way to reach students who might otherwise not be given a chance at a successful career, and to ensure the strong growth of the green industry.

If your school would like more information on this program, please contact Kristen Hale at the Illinois Nurserymen's Association office, (217) 525-6222.

AWARDS AND RECOGNITION

DEBORAH GREANEY
AWARDS CHAIR

AWARDS AND COMPETITIONS AVAILABLE FOR STUDENTS AND TEACHERS

A variety of opportunities are available for students and staff to receive awards and recognition for their efforts in science. The N.S.T.A. web page, HYPERLINK http://www.nsta.org. www.nsta.org, is a rich resource for information on current programs. Information and some applications can be downloaded from the web site. If you arenít online, information can also be quickly obtained through FAX on Demand. This service is available 24 hours a day and the number is 1-888-400-NSTA (6782). Area code 703 users should dial the local number: 312-9399. Make sure you include the correct form number when requesting information. You can also request forms by mail at the following address: National Science Teachers Association, 1840 Wilson Blvd. Arlington, Virginia 222201-3000

The following programs have a deadline date of November 14, 1997, so act quickly if you are interested in any of these programs.

OPPORTUNITIES FOR TEACHERS

American Water Works Association Award (Form # 561)
Eligibility: K-12 science teachers
This award recognizes one precollege teacher who has developed an innovative instructional program using a multicultural approach that encourages students at any level K-12 to explore and enjoy sciences related to drinking water.
Award: $1,000 and up to $500 to attend the NSTA National Convention

Barrick Goldstrike Exemplary Elementary Earth Science Teaching Award (Form # 562)
Eligibility: Full time K-6 science teachers
This award is given to an elementary science teacher who has demonstrated exemplary teaching practices in earth science, specifically environmental or geology. This would include innovative design and use of hands-on earth science materials, creative design and implementation of an earth science lesson plan or curriculum, and fostering student, school, and school-community instructional programs in elementary earth science.
Award: Desktop or laptop computer, $2,500 for the purchase of earth science materials and /or equipment for the award winnerís school, an all expense paid trip to NSTAís National Convention, and an all expense paid trip to the Nevada Mining Associationís Minerals education Workshop for teachers.

CIBA Specialty Chemicals Exemplary Elementary Science Teaching Award (Form # 555)
Eligibility: Full time elementary science teachers
This award is given to an elementary science teacher who has Demonstrated exemplary teaching practices in one or more of the following areas: creating science materials, using science materials, designing teaching plans and ideas, and fostering student, school, and school/community programs.
Award: $1,000, one-year membership in CESI and NSTA, and up to $500 to attend NSTA National Convention.

CIBA Specialty Chemicals Elementary Principal Award (Form # 556)
Eligibility: Elementary school principals
This award is given to an elementary principal who has demonstrated leadership in developing, implementing, and maintaining an outstanding elementary science program, supported staff development in science, promoted positive relationships between the schoolís science program and the community, and who has been an advocate and leader for the development of science process skills and positive attitudes toward science among children and teachers.
Award: $1,000, one-year membership in CESI and NSTA, and up to $500 to attend NSTA National Convention.

CIBA Specialty Chemicals Exemplary Middle Level and High School Science Teaching Award (Form # 557)
Eligibility: Full time middle level and highs school science teachers
This program recognizes a middle level and a high school teacher who have demonstrated exemplary science teaching practices in: creative use of science materials, design and use of innovative teaching plans and ideas, and development and implementation of department, school, or school/community programs that improve science instruction and/or stimulate interest in science and the learning of science.
Award: $1,000, one-year membership in NSTA, and up to $500 to attend NSTAís National Convention.

Drug, Chemical & Allied Trades Association Education Foundation's Making a Difference Award (Form # 563)
Eligibility: Innovative middle level science programs
This award will recognize and honor excellence in a grade 6-8 science program developed and implemented by middle level science teachers. Entries must show innovative and effective teaching strategies combined with a program that has influenced students to explore and investigate science and its application to global problems.
Award: $2,500 to be used to expand or enhance the winning science program.
The winning schoolís lead science teacher and principal will be awarded airfare and one nightís hotel accommodation to attend the NSTA's National Convention.

NSTA Distinguished Teaching Award (Form # 553)
Eligibility: K-college level teachers
NSTA members who are teachers who have made extraordinary contributions to the field of science teaching are honored with this award. The number of awards given each year is at the discretion of the judges.
Award: Formal citation, three nightís hotel accommodation, and $200 toward expenses to attend the NSTA's National Convention.

Gustav Ohaus Programs for Innovations in Science Teaching (Form # 564)
Eligibility: Science teachers in four grade-level categories: elementary, middle level, high school, and college level.
These awards encourage and honor science teachers who have developed innovative programs in one of the following areas: new curriculum design, instructional methods or techniques, unique organization, administrative patterns, new approach to laboratory activities, or other enhanced learning activity for students.
Award: One $1,000 and one $750 award in each of the four grade-level categories.

Robert H. Carleton Award (Form # 554)
Eligibility: NSTA members who are K-college-level science educators
This award is NSTA's highest honor, and it recognizes one teacher who has made outstanding contributions to and provided leadership in science education at the national level and to NSTA in particular.
Award: $5,000 medallion, formal citation, and an all expense paid trip to the NSTA's National Convention.
Science Screen Report Award (Form # 566)
Eligibility: K-12 science teachers
This award is given to a teacher who has creatively used commercially available films or videotapes to develop a science unit or theme.
Award: $1,000 and up to $500 to attend the NSTA's National Convention.

The Science Teaching Award (Form # 568)
Eligibility: K-12 classroom teachers
This award recognizes an outstanding classroom science teacher who has had a positive impact on his or her students, school and community through exemplary science teaching.
Award: $10,000 and an all expense paid trip to NSTAís National Convention; two finalists will also receive trips to the convention.

Sheldon Exemplary Equipment and Facilities Award (Form # 567)
Eligibility: K-12 classroom science teachers
This award will honor a teacher who has demonstrated exemplary approaches to science teaching and new designs using science equipment and facilities available at the K-12 level. Equipment and facilities include classroom and lab space, furniture, fixtures, and science teaching apparatus.
Award: $1,000 and up to $500 to attend the NSTAís National Convention

The deadline for the following program is January 21, 1998

Toyota TAPESTRY Grants for Teachers
Eligibility: Middle and high school science teachers must spend at least 50% of their classroom time teaching science. Elementary school teachers must teach some science in the classroom.
This award honors a teacher who has demonstrated exemplary approaches to science teaching and new designs using science equipment and facilities available at the K-12 level. Equipment and facilities include classroom and laboratory space, furniture, fixtures, and science teaching apparatus.
Program Summary: Grants are offered to K-12 science teachers who develop innovative projects that enhance science education in the school and/or school district. Fifty one-year grants totaling up to $500,000 will be awarded. To apply for funding, qualified teachers must submit a Toyota TAPESTRY proposal by the deadline. Proposals must describe a project including its potential impact on students, and a budget up to $10,000.
Grants will be awarded in two categories:
Environmental Education
The Environmental Education category funds projects that emphasize the efficient use of natural resources and protection of the environment. Students participating in these projects should gain an increased awareness of terrestrial, aquatic, and/or atmospheric environment and an understanding of their own interdependence with the natural world.
Physical Science
The Physical Science Application category includes projects that relate the laws, principles, and concepts of science (physics and chemistry) to phenomena and events relevant to studentsí lives. Physical science Application projects should involve the students own experiences and interests. Unique ways of applying science to technology and making physical science more accessible to students are encouraged.
Award: Fifty one-year grants of up to $10,000 each

E-mail or write NSTA for application information.

The deadline for the following program is February 8, 1998

Lab Product Association Awards (Form # 565)
Eligibility: Grades 9-12 teachers
Each year 3 secondary teachers win all expense paid trips to NSTAís National Convention, courtesy of LPA. To enter, teachers must write a letter explaining why they want to attend the convention, and why they would not be able to attend without LPA funding.
Award: Three all expense paid trips to the NSTAís National Convention.

Opportunities for Students
The entry deadline for this program is January 14, 1998.

16th Annual Duracell/NSTA Scholarship Competition
Eligibility: Students in grades 7-12 who are U.S. citizens and reside in the United States. Students may enter individually or in teams of two.
Student will design and build a device that runs on Duracell batteries and write a two-page description describing the device and its uses. They will draw a schematic of the device and submit a photograph of the device.
Award: There will be 50 winners in each category (grades 7-9 and 10-12). Savings Bonds will be awarded as follows:
1st place - $20,000
2nd place - $10,000
3rd place - $1,000
4th place - $500
5th place - $200
Trips: 1st and 2nd place winners, their parents, and their teachers will be flown to Las Vegas to attend an award ceremony at the 46th annual NSTA National Convention in April, 1998.
Entry Materials: To obtain an official entry form write to:
Duracell/NSTA Scholarship Competition
1840 Wilson Blvd.
Arlington, Virginia 22201-3000

The entry deadline for this program is February 3,1998.

1997-1998 Toshiba/NSTA ExploraVision Awards
Eligibility: Students in grades K-12 who are U.S. citizens.
Students will work in teams of three or four simulating Research and Development teams, along with a teacher advisor and an optional community advisor. Students will select a technology, or an aspect of a technology that is present in the home, school, or community. They will explore how it works, what it does, and how, when, and why it was invented. The students will then project into the future what that technology could be like in 20 years. This vision of the future must then be conveyed to others through both a descripton and a story board.
Awards: First place team will each receive a $10,000 Savings Bond. The second place team will each receive a $5,000 Savings Bond. Student members of the 36 regional teams will receive a $100 Savings bond. The 12 finalist teacher advisors and schools receive selected Toshiba products. Schools of the 48 regional winning teams will each receive a Toshiba TV and VCR. Finalist teams and their parents will be given a trip to Washington DC in June to attend the awards ceremony.
Entry Materials: To receive entry materials, visit the NSTA web page, or write:
Toshiba/NSTA ExploraVision Awards Program
1840 Wilson Blvd.
Arlington, Virginia 22201-3000

The entry deadline for this program is Thursday, March 19, 1998.

Craftsman/NSTA Young Inventors Program
Eligibility: Students in grades 4-6
This award encourages students to combine creativity and imagination with science, technology, and mechanical ability to invent and build a tool, or modify an existing tool.
Award: All winners will attend an award's ceremony to receive prizes. Bob Vila, Craftsman's spokesperson, will host the ceremony. The national winner will receive a $10,000 United States Series EE Savings Bond. The 11 regional winners will receive a $5,000 United States Series EE Savings Bond. The winning teachers and schools will receive prizes from Sears, Roebuck and Co. retail stores.
Entry Materials:
To receive entry materials, please write to:
Craftsman/NSTA Young Inventors awards program
National science teachers association
1840 Wilson Blvd.
Arlington, Virginia 22201-3000

NATIONAL SCIENCE FOUNDATION AWARDS

NSF's **Connections to the Internet Program provides grants,** usually of $15,000 over two years, to elementary and secondary schools with new ideas for using technology for Internet hookups. Because the program aims to reduce the cost of providing Internet services to schools, applicants must propose innovative ways to use technology (other than telephone and ISDN lines) to provide affordable Internet access that could eventually help others to connect. Application deadlines occur twice a year: January 31 and July 31. Contact Doug Gatchell or Dave Staudt, Division of Networking and Communications Research and Infrastructure, NSF, Rm. 1175, 4201 Wilson Blvd., Arlington, VA 22230; Tel. (703) 306-1949 e-mail dgatchell@nsf.gov or dstaudt@nsf.gov; http://www.cise.nsf.gov/ncri/nsf96-64.html. Refer to CFDA number 47.070.

ISTA MEMBER MELANIE WOJTULEWICZ SELECTED AS FINALIST FOR 1997 KATHY OSTERMAN AWARD RECOGNIZING SUPERIOR PUBLIC SERVICE IN THE CATEGORY OF OUTSTANDING PROFESSIONAL EMPLOYEE

Well wishers gathered at the Palmer House Hilton Hotel on Friday 9 May, to celebrate the accomplishments of outstanding metropolitan area government employees. The *Kathy Osterman Awards; Recognizing Superior Public Service*, formerly known as the *Superior Public Service Awards*, is a twenty-nine (29) year old Chicago tradition that honors outstanding metropolitan area government employees for their diligence, superior performance and achievements in service to the public.

The City of Chicago, Department of Personnel coordinates the recognition program, in conjunction with the Chicago Transit Authority, Chicago Park District, City Colleges of Chicago, Chicago Board of Education and the Metropolitan Water Reclamation District of Greater Chicago.

"The *Annual Kathy Osterman Awards Luncheon* is a wonderful event that celebrates the contributions of many dedicated public service employees who perform their duties in an outstanding manner," said Mayor Richard M. Daley.

"Award nominees were selected by their colleagues because they are outstanding employees. Winners and finalists in the seven award categories have made significant contributions to public service through their dedicated efforts. I congratulate the recipients for their achievements and thank James Danos, on behalf of MetLife, who graciously sponsors the annual awards program!," said Glenn E. Carr, President of the *Kathy Osterman Awards* and Department of Personnel Commissioner.

Melanie received a handsome mahogany and brass plaque. She has been an employee of the Chicago Board of Education for 28 years and presently serves as Manager of Science Education with the Board.

Congratulations Melanie!

NABT (National Association of Biology Teachers) OBTA (Outstanding Biology Teacher Award) 1996/97

Mrs. Shari Cohen
Homewood-Flossmoor High School
999 S. Kedzie
Flossmoor, IL 60422

In addition to being recognized as the 1996/97 OBTA from Illinois, Mrs. Cohen's credentials include the following:

Nominee - Presidential Award for Excellence in Science Teaching 1994/95
President-Elect of Illinois Association of Biology Teachers 1996/97
Participant in Woodrow Wilson National Fellowship at Princeton, Neurobiology
High School Outreach Grant from Woodrow Wilson National Fellowship Foundation - National Leadership Program for Teachers 1996
Pre-screening Reader for 1997 Woodrow Wilson National Fellowship at Princeton
Supplemental Reviewer of the BSCS Module: "The Puzzle of Inheritance: Genetics and the Methods of Science"
Organizer of Genetic Conference Update for Suburban Students and Teachers
Woodrow Wilson Outreach Bioethics Workshop Participant
Wisconsin Fast Plants Workshop Participant
Biotech Focus Group, UIC College of Pharmacy
Presenter at three national conventions of the National Association of Biology Teachers
Steering Committee member for the 1978 NABT Convention, Chicago
Advanced Placement Workshop Participant - Stanford University, Purdue University, Triton Community College
MCET (Mass. Center of Educational Television) - Human Genome Project - Exploring the Scientific and Humanistic Dimensions - field testing
Participant in the NSF funded NASA - Stanford Space Science Research eight week summer program
Participant in Howard Hughes Funded Biotechnology Laboratory
Genethics Workshop, Ball State Outreach at Chicago, participant
Kappa Delta Pi Honorary Education Society
Cooperating Teacher
Participant in numerous workshops at Homewood-Flossmoor High School
Private Day School - Board member - 5 years, Chairman - 2 years, Co-President - 1 year
Steering Committee member and fundraiser for charitable organizations
Teacher - Homewood-Flossmoor Community High School, Flossmoor, IL - 30 years
B.S. - University of Illinois, Champaign
M.S. - Valparaiso University

If you would like applications for the 1997/98 OBTA Award from Illinois, after January 1, 1998 contact:
Mrs. JoAnne Edwards
OBTA Illinois State Chair
Wheeling High School
900 S. Elmhurst Rd.
Wheeling, IL 60090
The deadline for receiving applications is March 1, 1998.

ENVIRONMENTAL EDUCATION TEACHER OF THE YEAR

The Illinois State Board of Education(ISBE) has named science teacher **Bill Beckman** the 1997 ENVIRONMENTAL EDUCATION TEACHER OF THE YEAR. The announcement was made at the Springfield CROWN PLAZA Holiday Inn in July. The announcement happened during a breakfast session at the annual meeting for the superintendents of the Regional Offices of Education. Bill Beckman is a science teacher at East Peoria Community High School District 309 and an active ISTA member.

During his off-hours, he serves as co-chair of the CLEAN WATER CELEBRATION, and Bill is the central region coordinator of the Illinois Middle School Groundwater Project. The Project is based at the Regional Office of Education at the Peoria County Courthouse. The program is available to schools in Mason, Peoria, Tazewell and Woodford counties. Telephone (309) 672-6906. Fax (309) 672-6053.

CONGRATULATIONS TO THE 1997 PRESIDENTIAL AWARDS FOR EXCELLENCE IN SCIENCE TEACHING WINNERS

ELEMENTARY

Christine Jones
Lincoln School
Springfield
Gay Murray
Ben Franklin Elementary

Glen Ellyn
Linda Taylor
Horace Mann Choice School
Rock Island

Linda Anderson
East Prairie School
Skokie

Dorothy Bailey
Marshall Elementary
Granite City

Denise Edelson
Hannah G. Solomon Elementary
Chicago

Debra Greaney
Waterloo Middle School
Waterloo

Karen Jensen
Rose E. Krug School
Aurora

Jennifer May
Ellis School
Belleville

Donna Rakers
Freeburg C.C.S.D.
Freeburg

SECONDARY

Carolyn Phillips
Dallas Comm. Elementary #336
Dallas City

Diana Roth
Lanphier H.S.
Springfield

Tracy Trimpe
Havana Jr. H.S.
Havana

Pamela Abbott
Roxana High School
Roxana

Larry Brown
Morgan Park Academy
Chicago

Deborah Clinebell
Waterloo Jr. H.S.
Waterloo

Thomas Graika
Park Jr. H.S.
LaGrange Park

Karlene Johnson
North Jr. H.S.
Collinsville

Judith Lachance-Whitcomb
Jordan Community School
Chicago

Elaine Modine
Waubonsie Valley H.S.
Aurora

John Thompson
Illinois Math & Science Academy
Aurora

YES, I WOULD LIKE TO CONTRIBUTE TO THE ISTA SPECTRUM

I have a good idea that I'd like to share!

Name: _____

School or Business:
(name) _____
(address) _____
(city, state, ZIP) _____
(telephone) (____) _____

Home:
(address) _____
(city, state, ZIP) _____
(telephone) (____) _____

Title of Contribution:_____

I would like may article to appear in:

___**ARTICLES**
___**IN FOCUS**
___**SPECIAL INTERESTS**
___**MINI IDEAS**
___**REVIEWS**
___**POTPOURRI**
___**OPPORTUNITIES**
___**MEETINGS**
___**AWARDS/RECOGNITION**
___**FIELDTRIPS/WORKSHOPS**
___**EDUCATIONAL MATERIALS**

Please print my contribution in the following issue(s):

___**Fall** (due June 1)
___**Winter** (due September 1)
___**Spring** (due December 1)
___**Summer** (due March 1)

SPECTRUM welcomes black and white glossy photographs. We can sometimes use color pictures but they must be sharp with high contrast. Please enclose a stamped self-addressed envelope if you want your photos returned.

Send to:

Diana Dummitt
ISTA Spectrum
University of Illinois
College of Education
1310 S. Sixth Street
Champaign, IL 61820

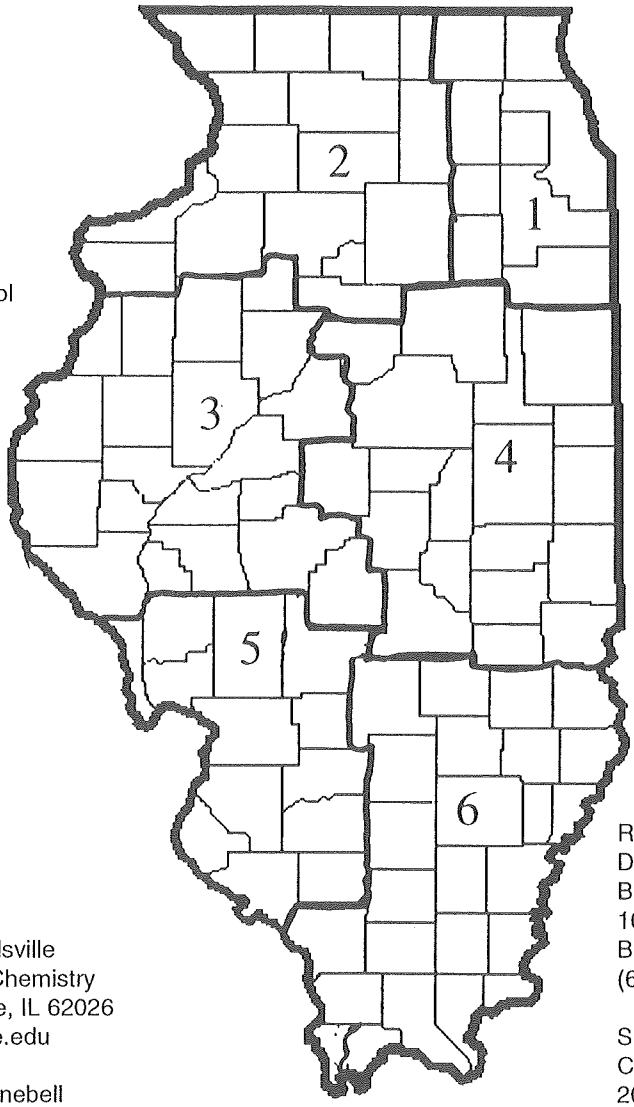
ISTA REGIONAL DIRECTORS

REGION III
Don Powers
Science Education Center
Western Illinois University
Macomb, IL 61455
(309)298-1258
FAX (309)298-2222
dpowers@ccmail.wiu.edu

Susan Grzanich
Calvin Coolidge Middle School
2708 W. Rohmann Avenue
Peoria, IL 61604
(309)672-6506
SGRZ0209@aol.com

REGION IV
Marilyn Sinclair
Curriculum & Instruction
University of Illinois
1310 S. Sixth Street
Champaign, IL 61820
m-sincl@uiuc.edu

Georgiean Benson
Washington School
100 W. Jefferson
Monticello, IL
gbenson@net66.com



REGION I
Sylvia Gilbert
Rogers Elementary School
7345 N., Washtenaw
Chicago, IL 60645
773-534-2132
sgilbert@megsinet.net

Al Fleming
Deerfield High School
1959 Waukegan Road
Deerfield, IL 60015
847-432-6510

REGION II
Steve Chelstrom
Orion Middle School
800 12th Avenue
Orion, IL 61273
309-526-3392

Karen Meyer
Ridgewood Elementary
9607-14 Street West
Rock Island, IL 61201
(309)793-5980
MsKMeyer@aol.com

REGION V
Pam Keck
SIU-Edwardsville
Box 1652, Chemistry
Edwardsville, IL 62026
pkeck@siue.edu

Deborah Clinebell
Waterloo Jr. High School
200 Bellefontaine Drive
Waterloo, IL 62298
dclinebe@htc.net

REGION VI
Deborah K. Clark
Benton Middle School
1000 Forrest Street
Benton, IL 62812
(618) 438-4011

Suzanne Asaturian
Carbondale Comm. H.S.
200 N. Springer Street
Carbondale, IL 62901
(618) 457-3371 x 242
FAX (618)549-1686
sasaturian@cchs165.jacksn.k12.il.us

Listing of Counties Comprising Each ISTA Region

Region I	McHenry, Lake, Kane, Cook, DuPage, Kendall, Will, Grundy, Kankakee
Region II	Jo Daviess, Stephenson, Winnebago, Boone, Carroll, Ogle, DeKalb, Whiteside, Lee, Rock Island, Henry, Bureau, LaSalle, Putnam, Marshall, Mercer
Region III	Henderson, Warren, Knox, Stark, Peoria, Hancock, McDonough, Fulton, Tazewell, Schuyler, Mason, Adams, Brown, Cass, Menard, Pike, Scott, Morgan, Sangamon, Christian
Region IV	Woodford, Livingston, Ford, Iroquois, McLean, Logan, DeWitt, Piatt, Champaign, Vermillion, Macon, Shelby, Moultrie, Douglas, Edgar, Coles, Cumberland, Clark
Region V	Calhoun, Greene, Macoupin, Montgomery, Madison, Bond, St. Clair, Clinton, Monroe, Washington, Randolph, Perry, Jersey
Region VI	Fayette, Effingham, Jasper, Crawford, Marion, Clay, Richland, Lawrence, Wayne, Edwards, Wabash, Jefferson, Franklin, Hamilton, White, Jackson, Williamson, Saline, Gallatin, Union, Johnson, Pope, Alexander, Pulaski, Massac, Hardin

ILLINOIS SCIENCE TEACHERS ASSOCIATION

ISTA is Illinois' largest organization dedicated to the improvement of science education at all levels.

NAME _____
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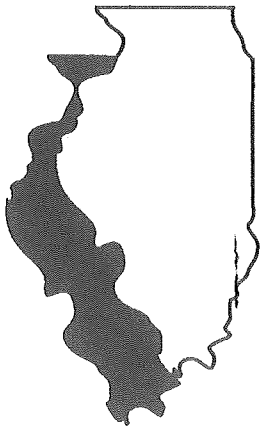

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CITY STATE ZIPCODE PHONE

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* MARK BOX NEXT TO ADDRESS YOU WANT YOUR ISTA MAIL SENT TO.
THIS INFORMATION WILL NOT BE MADE AVAILABLE TO ANY OUTSIDE GROUPS.

Check applicable categories in each column

___ Elementary Level	___ Elementary Sciences	___ Teacher
___ Middle Level	___ Life Sciences/Biology	___ Administrator
___ Senior High Level	___ Physical Sciences	___ Coodinator
___ Community College	___ Environmental Science	___ Librarian
___ College/University	___ Earth Science/Geology	___ Student
___ Industry/Business/ Government	___ Chemistry	___ Retired
	___ Physics	
___ Other (list)	___ General Science	
_____	___ Integrated Science	
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REGULAR MEMBERSHIP $25.00

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SIGNATURE OF UNIVERSITY STAFF PERSON/POSITION CERTIFYING STUDENT IS FULL-TIME

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SEND FORM WITH CHECK OR MONEY ORDER MADE PAYABLE TO "ISTA" TO: DIANA DUMMITT, ISTA MEMBERSHIP, COLLEGE OF EDUCATION, UNIVERSITY OF ILLINOIS, 1310 S. SIXTH STREET, CHAMPAIGN, IL 61820

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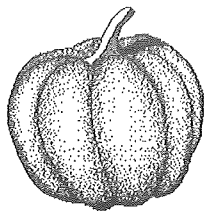

FALL 1997