Summer 2004, vol. 30, no. 1 The Journal of the Illinois Science Teachers Association

ista SPECTRUM

Congratulations to Marsha Lee 2004 ExxonMobil Excellence in Secondary Science Teacher

Marsha was honored during the ISTA Conference Awards Reception at the Bloomington Challenger Center on July 13, 2004. She is congratulated by Marylin Lisowski, ISTA President and J. Patrick McGinn, Manager, Midwest Public Affairs for ExxonMobil. Read more about Marsha on page 7 of this issue.

In This Issue

SPECTRUM

THE JOURNAL OF THE
ILLINOIS SCIENCE TEACHERS ASSOCIATION
Volume 30, Number 1

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The Illinois Science Teachers Association recognizes and strongly promotes the importance of safety in the classroom. However, the ultimate responsibility to follow established safety procedures and guidelines rests with the individual teacher.

The views expressed by authors are not necessarily those of ISTA, the ISTA Board, or the *Spectrum*.

SPECTRUM IS PRINTED ON RECYCLED/RECYCLABLE PAPER

SPECTRUM

The Journal of the Illinois Science Teachers Association

Summer 2004 Volume 30, Number 1

Articles

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President's Corner

Marylin Lisowski

Eastern Illinois University

Dearest friends,

As science educators, we are quite experienced with seeking out variables that significantly affect our experiments and/or situations. In several instances, it is difficult to single out just one contributing variable so we continue our quest by searching for multiple causal factors for some dilemmas that face us. Currently, memberships in professional organizations are experiencing a cataclysmic drop not only nationally but in our own state organization. Attempts to identify the factors that are responsible for this decline are leading us to a quagmire of unknowns. What are these multiple variables and how can we address them responsibly? Are professional organizations heading for a "threatened then endangered" listing and what variables, programs, structures are needed before they succumb to "extinct" status? ISTA's mission statement is printed below. Our programs, offerings and Strategic Plan are in concert in trying to attain these aspirations. Our questions to you focus on whether this Mission addresses your needs and if so or if not, what can and what should we do to encourage others to become an active part of this organization and prevent the diminishment of our membership numbers? You are a member and we applaud your commitment. How can we entice others to follow your professional example? Please share your thoughts and suggestions with us as we search and plan for programs and offerings that would maintain the quality status of our organization. However, we will continue to focus on the great things that are happening. The Summer of 2004 is in full swing and with it all comes all the glories and exuberance that nature brings during this verdant time of the year. I hope that you will have endless opportunities to explore, experience and share the vibrancy that summer offers. As Thoreau once stated, "Nature Teaches" and may we all allow nature to enrich and inspire us this summer.

With best wishes,

Marylin Lisowski

The mission of the Illinois Science Teachers Association is to provide proactive leadership that will improve science education and achievement for all students by promoting effective classroom practices, supporting sustained professional development opportunities, facilitating communication, collaboration and networking opportunities, and advocating for the needs of science teachers.

Spectrum Establishes Focus Area Editors

Raymond Dagenais

Chair, Editorial Board

For a number of years, the notion of establishing an editorial board for the official publication of the Illinois Science Teachers Association, the *Spectrum*, has been discussed. Beginning this summer, the idea has come to fruition. Five talented and experienced science educators have accepted invitations to serve as editors for the journal. The editorial focus areas and their editors are listed below.

These Focus Area Editors will solicit, review, and recommend articles addressing the different disciplines of science as well as articles that cover the many aspects of science education in their focus areas. This new configuration of support for the *Spectrum* will result in a wider variety of articles that focus on different levels of the educational system. Each issue of the *Spectrum* will have material that expands our understanding of science and science education as well as ideas that can be used in classrooms at differing levels. Those individuals interested in submitting articles to the appropriate focus area editor should follow the Publication Guidelines listed on the next page and on the ISTA Web Page at: http://www.ista-il.org/spectrum.htm

Welcome to our Focus Area Editors!

Building a Presence for Science Program
Mary Lou Lipscomb, Illinois Mathematics and Science Academy
lipscomb@imsa.edu

Higher Education Level
Maria Varelas, University of Illinois at Chicago
mvarelas@mailserv.uic.edu

Secondary School Education
Gary Ketterling, Benedictine University, Lisle, IL
gketterling@ben.edu

Middle School Education
Richard NeSmith, Eastern Illinois University
bioscience_ed@yahoo.com

Elementary School Education
Jean Mendoza, University of Illinois, Champaign, Urbana
jamendoz@students.uiuc.edu

Guidelines for Writing for the *Spectrum*

The quality of he *Spectrum* is directly proportional to the relevance of its contents to your classroom. This invitation is a request for you to help colleagues across the state by sharing your experience. In responding to this invitation, you will: obtain experience in publishing, receive some "feed-back" from the teachers across the state about your idea(s), and participate in the responsibility that is key to science: The communication of ideas!

With this in mind, share with us your teaching ideas for curriculum, laboratory experiences, demonstrations, assessment, portfolios and any innovations you have found to be successful with science students. Photographs are welcome, preferably high contrast, saved as tif files.

We prefer to receive articles electronically. These can be emailed as attachments to Diana Dummitt at <ddummitt@uiuc.edu>. If you are unable to send articles via email, the article can be send on a disk (IBM or Mac) or as a hard copy. Please include a title page with the author's name and affiliations, a brief biographical sketch of three or four sentences, and home address, home telephone number, and email address (these will not be published). If there is more than one author, send all information for each author. In addition, you can include photos in jpg or tif format and hard copies of figures and tables. References are helpful. Please also indicate whether or not the article has been published or submitted elsewhere. Materials, including photographs, will be returned only if accompanied by a request in writing and a self-addressed stamped envelope.

Deadlines for upcoming issues:

November 1, 2004 for Winter

March 1, 2005 for Spring

July 1, 2005 for Fall

Sad News

Dear Friends,

Many of you knew that our friend and co-worker in water and education, Mark Bonardelli, contracted Hepatitis B many years ago. For the last couple of years, he had more difficulties with this disease and its complications. He tried to follow his doctor's dietary recommendations over these years, and he was being evaluated for a liver transplant.

Although he wanted to be at the annual Clean Water Celebration in Peoria, where he had presented stations and exhibits for the past 8 or more years to students and teachers, he was unable. He went into St. Johns Hospital in Springfield hospital the next day on March 23 with esophageal varices which caused internal bleeding. After more than a week on a respirator in the intensive care unit, the varices seemed to be healed, and he could communicate again, essential to Mark's well-being. His companion Janelle took very good care of him, along with his brother Phillip and nephew Paul from Vancouver. A number of his friends and coworkers crowded the waiting room, wishing they could do something to help.

I last visited with him on April 1, and he had difficulty talking, but his mind was normal. We talked about people, music, and events (gigs) that Mark was looking forward to doing. Our talk was peppered with his normal colorful language.

Unfortunately, On April 2nd, his kidneys failed, and he was airlifted to Barnes Hospital in St Louis. There he began bleeding internally and his condition deteriorated rapidly. He passed away on April 5. Following services in Springfield, he was buried April 16th in Montreal in his family's plot in the largest cemetery in Canada.

The last water education events we did together were the Science in the South Teachers Conference March 5 in Carbondale, and a training session for Clean Water Celebration presenters, March 15 in Tremont. He energetically helped teachers with materials at Carbondale, but was very tired after the event. He was extremely apologetic about not being well enough to teach at the Clean Water Celebration on the 22nd.

We are all still in shock and it is difficult to think of coming to work without having Mark to cheer us up with some of his craziness or music trivia or conservatism or latest news from the Economist. He could have been a member of the flat earth society, if he had not travelled as widely as he did. And the French could do no wrong. But, Mark is really gone! We can do nothing about it, except share our grief and stories with Mark's family and friends.

Many people wrote tributes to Mark on the funeral home site, and I hope that you will do so, too. It would mean a lot to Mark's family in Canada, Peru, Italy, and Mexico, as well as his Springfield and Illinois families, which include most everyone Mark ever met.

Mark was like the younger brother I never had, who frequently travelled to international destinations, who knew everything related to music and musicians, who enjoyed meeting people of all types, who was frugal beyond description, who had a very strong traditional Catholic faith, who loved to teach children of all ages, and who asked for direction at times.

Mark was dedicated to protecting our water through educating youth and teachers. His presentations were always humorous yet educational. He could relate to most any audience, especially young ones, and his storytelling always had a message. He also organized and improved the Discovery Tent at the Illinois State Fair and volunteered to staff the water exhibit at the DuQuoin State Fair. During the past year he probably spoke to close to 5000 people on subjects related to water and education.

We will miss Mark a great deal and his natural resource legacy can best be seen in the smiles and gleaming eyes of the kids he taught so well.

Thanks to he many volunteers who helped cover all the educational events this spring that Mark was so anxious to continue.

Harry Hendrickson
Groundwater Education
IL Dept. of Natural Resources
1 Natural Resources Way
Springfield, IL 62702
217-785-8577
hhendrickson@dnrmail.state.il.us

Here are three websites with information on Mark. The first site has the article from the front page of the Springfield Journal Register lamenting the loss of one of Springfield's most colorful expat characters.

http://10.80.218.105/orep/news/Toomey041304.pdf

www.bonardelli.com (Mark's own website)

www.kirlin-egan-butler.com (Search for Bonardelli in obits and you can read tributes and put in your own tribute in the GUESTBOOK.)

Around the State

Reports from the Regional Directors

Region I : Dr. Rich Mitchell

The plans are being finalized for the upcoming ISTA-sponsored workshop for new and experienced teachers on September 17, 2004. ISTA, along with Flinn Scientific, will host the workshop at the Lindner Conference Center in Lombard, Illinois, from 8:30 a.m. until 2:30 p.m. Larry Flinn will conduct a safety workshop while master teachers will share demonstrations, classroom tips, favorite laboratory activities, etc. to get the year started with great ideas for science faculty. Attendance at the workshop will include an automatic membership for non-ISTA members. The North Suburban Science Supervisors, the South Suburban Science Supervisors, and the West Suburban Science Supervisor groups will be enlisted to send participants to this event. Contact Rich at: Rmitchell@bhsd228.com

Region 1: Anna Zuccarini

April 13, 2004: The sales representative for *Legos*, Rick Highberger, conducted this workshop for upper elementary/middle school teachers. It highlighted the new products *Legos* has to offer in the life sciences and gave the teachers time to run through some its activities. He also presented the eLab car and the other energy products, permitting time for the teachers to go through those activities.

May 11, 2004: Ed Gorny, GIS/GPS trainer, instructed teachers in the purpose of use of GIS and GPS. He demonstrated how the software program works and showed some examples of its use in the classroom. He had free software for the teachers to install. Join us next time and bring a friend. For meeting times and locations, contact Anna at: Anna_Zuccarini@ipsd.org

Region 3: Jill Carter and Randal Musch

Randal and I did not have a spring event. However, we are planning a back-to-school event to be held sometime in September. Both of us have encouraged teachers in our area to attend the ISTA conference this summer. We have had some positive responses in this regard. We will have a full report this fall on our back-to-school event. Contact Jill at: jcarter@pekinhigh.net or Randal at: pvnrt@fgi.net

Region 4: Kendra Carroll

Although I did not hold a regional event yet, I brought another teacher and an administrator from my district to the convention. One of these individuals is new to ISTA activities. I have also promoted the convention and ISTA membership at several meetings and workshops I have attended. In addition, I have contacted several individuals who have agreed to be the POC for their school. Although Susan and I have had limited communication, we have begun to collaborate on several ideas for a fall event. Contact Kendra at: carrollk@shiloh.k12.il.us

Region 4: Susan Golden

At end of the year meetings for middle school, high school, and elementary schools. I solicited teachers to become members and encouraged them to attend the summer conference. The meetings were held in May to discuss the piloting of, and possible purchase of, textbooks. At the meeting I passed out flyers and talked about ISTA. I shared the mini-grant possibility and a lot of teachers were interested and excited and wanted to join for the opportunity to apply for the grants. I encouraged the teachers to attend the summer conference and answer their questions about why it was occurring in the summer. Contact Susan at: sgolden@dps61.org

Region 7: David Krumwielde

Region VII had a direct mail campaign. A flyer and letter was sent to all board members and current Chicago area members for an entertaining event for members and guests. Seven new members signed up at the event and many others through mail as a result. A few paying guests attended and revenues exceeded expense because of discount donations made to event costs. A good time was had by all. Testimony from other board members can attest to success as some traveled a few hours

to support. Thanks for support. Our difficulty was in misinformation in database for effective communication with members. We plan to have 3 events next school year: kickoff, winter and spring. ISTA events have been posted on CPS list server. Four attendees responded to direct mail. The majority were personal contacts, including all new members who are High School teachers. An investment will be requested to raise membership in a traditional marketing mode.

ISTA was recognized at Chicago City Wide Science Fair at Museum of Science and Industry for donating a $ 50.00 award to a project submitted. Funding was underwritten by Bauer Farm. This fair is run by a corporation that supports science projects from city of Chicago and it is a premier event. ISTA joined a host of sponsors of awards. For more information, visit the Chicago Math and Science Initiative website at: http://www.oms.cps.k12.il.us/cmsi/

A Chicago-based Northern Illinois conference is being explored with partners similar to the established southern and western Illinois regional activities. One large teacher event is hosted this summer at Navy pier with corporate sponsors. Contact David at: Krumfun@aol.com

Did you miss the ISTA State Conference in Bloomington?

Watch the ISTA website and new Members Listserve for opportunities to network in your region at ISTA Fall Regional Meetings

Meetings currently scheduled:

Chicago Suburban **September 17, 2004**

ISTA, along with Flinn Scientific, will host a workshop at the Lindner Conference Center in Lombard, Illinois, from 8:30 a.m. until 2:30 p.m. Contact Rich Mitchell at: Rmitchell@bhsd228.com

Northwestern Illinois **October 2, 2004**

October 2 from 8:30 am to 1:00 pm in Rockford at the Discovery Center, Riverfront Museum, and Burpee Museum complex, 700 Main Street, Downtown Rockford, from 8 am to 1 pm. Over a dozen presentations are scheduled. Includes a continental breakfast and box lunch with refreshments inbetween. For more details, contact Don Terasaki at: dsaki@hotmail.com or Larry McPheron at: lamcp@hotmail.com or check the ISTA website.

Mike Lach, CPS Director of Science, and Marylin Lisowski, ISTA President, pause during the festivities at the ISTA members' reception sponsored by Prentice Hall at the NSTA National Convention in Atlanta

Awards

Congratulations to Marsha Lee 2004 ExxonMobil Excellence in Secondary Science Teaching Awardee

Congratulations, Marsha!

Marsha teaches Environmental Lab Science, Science Investigations, Anatomy/Physiology, Algebra I and II, and Transitional Math at Casey-Westfield High School. She is involved in long term environmental monitoring and her students submit data related to stream, forest and prairie habitats to the Illinois Department of Natural Resources. She is very actively involved in numerous in-service programs and has presented workshops at both the state and national level.

One of Marsha's former student's wrote, "She was a very positive, energetic teacher who was always looking out for her students. She made science fun, interesting, and easy to learn. Mrs. Lee took science out of the textbook and applied it to real life. Having Ms. Lee as my science teacher encouraged me to continue in a science-related career. She was never intimidating and was always supportive and encouraging. She was a teacher I could count on."

Marsha's exceptional background, lesson plan, application, and recommendations made choosing her as the 2004 ExxonMobil Excellence in Secondary Science Teaching awardee an easy task.

Find out more about these and other awardees at the ISTA website. Have you won an award lately? Contact Awards Chair Eeva Burns at www.ista-il.org

Congratulate these ISTA Members who have won recently won awards!

Bill Beckman — *2004 National RadioShack Teaching Award.*

Jill Carter — *Illinois Environmental Educator of the Year 2004 (EEAI)*

Harry Hendrickson — *Making Waves Award*

Marylin Lisowski — *Excellence in Science and Technology Award — Eastern Illinois University*

Deb Perryman — *Illinois Teacher of the Year 2004*

Gary Swick — *Farmers Insurance Group 2004 Outstanding Environmental Science Teacher presented by Peggy Notebaert Nature Museum*

Carol VanDeWalle — *WIU Maurice G. Kellogg Award for Excellence in Science Teaching*

Bob Williams — *Illinois River Valley Conservancy Award from Nature Conservance*

Congratulations to Tim McCollum, 2003 Illinois Presidential Awards for Excellence in Mathematics and Science Teaching Awardee (Science Grades 7-12)

And...

Congratulations to these 2004 Illinois State PAEMST Science finalists (Grades K-6)

Jean Gotkowski
Reskin Elementary School, Glendale Heights

Janice Gustafson
C.R. Hanna Elementary School, Orion

Becky Jaramillo
Norwood Elementary School, Peoria

Join me in congratulating these outstanding teachers for their excellence in teaching and wishing them best of luck at the national level. Thanks to our Awards Chair, Eeva Burns, and her great committee for the many hours they spent evaluating the written and video portions of the applications.
Diana Dummitt
PAEMST State Coordinator, Science

For more information on the Presidential Awards for Excellence in Mathematics and Science Teaching go to:
www.nsf.gov/pa

Thanks to our 2004 Illinois PAEMST Science Selection Committee

Barbara Brown
Stanton Junior High School

Eeva Burns, Chair
Taveirne Middle School

Carol Foreman
Taveirne Middle School

Lenayn Janusz
Big Hollow Elementary School

Angie McAvinney
Big Hollow Primary School

Four Chicago Public School students are awardees in the 55th Intel International Science and Engineering Fair held in Portland, Oregon

Tony Crowe and Melanie Wojtulewicz, Chaperones

Amen Abdulrasool, 16, Junior, Lane Tech
GPS Navigation Means of Travel for the Blind. Mike Robles, Sponsor.
- Third Place Grand Award. $1000

Shamita Chaudhuri, 18, Senior, Lincoln Park.
Microarray Analysis Reveals Glucocorticoid-regulated Survival Genes that are Associated with Inhibition of Apoptosis in Breast Epithelial Cells. James Galinski, Sponsor.

- National Anti-Vivisection Society Scholarship Award of $5,000 for projects that best promote scientific advancements through methods that do not harm animals, that work to replace live animals with non-animal methodologies or for animal-based research that benefits animals using non-invasive techniques or in an observational setting.
- National Taiwan Science Education Center. Trip to attend the Taiwan International Science Fair in February, 2005. This award includes round trip ticket, food, accommodations and activity expenses for each student.
- Endocrine Society Finalist Award of $500, Certificate, book on the Endocrine System, and a T-shirt.

Sehar Gafoor, 17, Senior, Lincoln Park.
Mechanism of Glial Activation by S100B with Relevance to Alzheimer's Disease. James Galinski, Sponsor.
- Showboard, Inc. Second Award of $100.

Cesar Marquez, 16, Junior, Lane Tech.
Effect of Parathyroid Hormone on Tartrate-Resistant Acid Phosphate Activity: Osteoporosis. Paula Stern, Sponsor.
- Albany College of Pharmacy of Union University. The Albany College of Pharmacy – Biomedical Sciences Excellence Award is presented to selected individuals demonstrating outstanding achievement in the area of biomedical sciences - includes an annual $5,000 scholarship. Total value of the Scholarship is $20,000.
- Endocrine Society Honorable Mention Award. Certificate, book on the Endocrine System, and a T-shirt.

Why not apply to be the next PAEMST awardee?

The Presidential Awards for Excellence in Mathematics and Science Teaching (PAEMST) Program was established in 1983 by The White House and is sponsored by the National Science Foundation (NSF). The program identifies outstanding mathematics and science teachers, kindergarten through 12th grade, in each state and the four U.S. jurisdictions. These teachers will serve as models for their colleagues and will be leaders in the improvement of science and mathematics education. The competition alternates each year between teachers of grades 7-12 and teachers of grades K-6. In 2005, teachers of grades 7-12 mathematics and science in each state and the four U.S. jurisdictions will be eligible to apply. Teachers of grades K-6 will be eligible for the Presidential Awards in 2006. The nomination form for 2005 can now be downloaded by going to: www./nsf.gov/pa

The 2004 PAEMST Awardees will be announced at the beginning of March 2005. Each Presidential Awardee will receive a $10,000 award from the National Science Foundation. Each Awardee will also be invited to attend, along with a guest, recognition events in Washington, D.C. during the third week of March 2005. These events will include an award ceremony, a Presidential Citation, meetings with leaders in government and education, sessions to share ideas and teaching experiences, and receptions.

Thanks to all of our Wonderful 2004 Conference Vendors!

A+ Technology Solutions, Inc.

American Association for Laboratory Animal Science

Bio-Rad Laboratories

Carolina Biological Supply Company

Center for Mathematics, Science, and Technology at Illinois State University

CPO Science

Delta Education

DePaul-NASA Space Science Center

Discovery Children's Museum

E Instruction

EduSuccess

Environmental Education Association of Illinois

Facilitating Coordination in Ag. Education

Fermilab Education Office

Fisher Scientific Education

Fizz Bang Science

Flinn Scientific

Frey Scientific

Glencoe/McGraw-Hill

Harcourt School Publishers

Holt, Rinehart and Winston

I-DNR Education

Illinois Association of Aggregate Producers

IL DCEO

I-DNR Groundwater Education

IL State Geological Survey

Illinois State Museum

Illinois Environmental Protection Agency Region 5

Illinois Mathematics and Science Academy

Illinois State Water Survey

Illinois NET

Illinois Petro leum Resources Board

It's About Time

JASON Foundation

K'NEX Education

Lab-Aids, Inc.

McDougal Littell

MicroTech Microscope Sales and Service

Modern Biology

Museum of Science and Industry

Musically Aligned

National Geographic

Ohaus Corporation

Pasco Scientific

Pearson Learning

Pitsco Lego Educational Division

Pitsco System Sales

Prentice Hall

Science Fair Supply Co.

Science Kit and Boreal Laboratories

Secret Agent Worms

Showboard, Inc.

Texas Instruments

The Science Connection

The Scope Shoppe, Inc.

UIUC College of Engineering

UIUC Dept of Crop Sciences

US Environmental Protection Agency

Usborne Books

Vernier Software & Technology

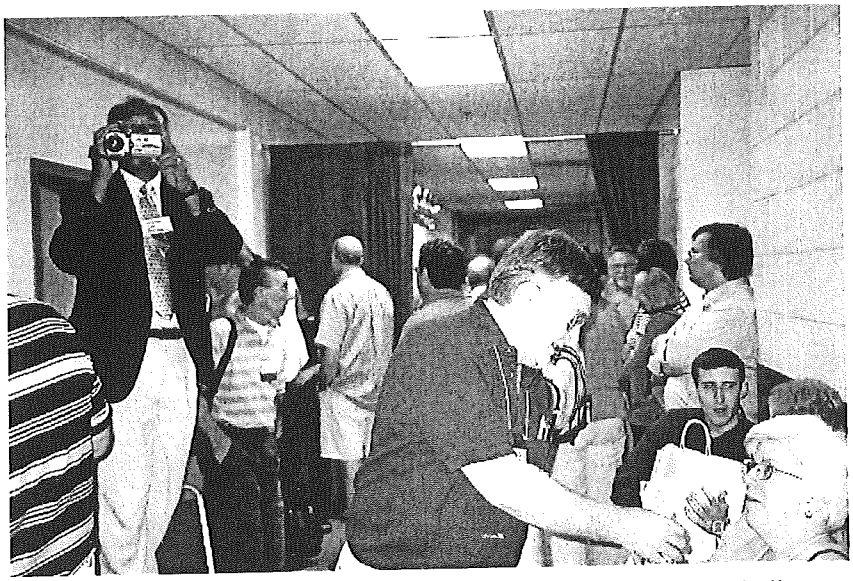
Veterinary Technician Association of Illinois

Wildlife Prairie State Park

World of Boomerangs

2004 Bloomington
Were You There?

ISTA attendees were "blown away" by the meteorological event which started at 2:45 pm on July 13th over the Interstate Center. Comments such as, "Gee, I've never seen wind go straight up before," and "Look at that rotation overhead," were heard. Although the management sternly commanded all to stay within the confines of the hallway, predictably, dozens of science teachers were seen outside with their faces to the skies throughout the tornado warning. Hundreds of ISTA members, presenters, and vendors spent an unusual time of "up close and personal" networking in the kitchen hallway of Interstate Center.



Board member Don Terasaki records the mega-networking in the kitchen hallway.

Many new and preservice teachers brave the winds to remain in the Exhibit Hall for cookies, punch, and the chance to win a doorprize. Barbara Sandall and Rose Camillone assisted ISTA President, Marylin Lisowski in distributing the many prizes to the excited teachers.

Special thanks to our...

2004 Conference Sponsors

Bloomington Challenger Learning Center

Center for Mathematics, Science, and Technology at Illinois State University

DePaul Space Science Center

JASON Foundation

Learning Point Associates

Museum of Science and Industry

National Geographic

Prentice Hall

Texas Instruments

Many thanks to our Awesome Committee:

Gwen Pollock, ISBE

Marilyn Morey and Karen Lind, CeMaST

Doorprize Donors

Carolina Biological
CPO Science
EduSuccess
Fisher Scientific
Frey Scientific
Harcourt School Publishers
Holt Rinehart and Winston
I-DNR Education
Illinois State Water Survey
K'NEX Education
Lab-Aids
McDougal Littell
MicroTech Microscope Sales & Service
Musically Aligned
Pasco Scientific
Pearson Learning
Prentice Hall
Science Fair Supply
Showboard, Inc.
Texas Instruments
The Science Connection
The Scope Shoppe, Inc.
Usborne Books
Vernier Software & Technology

Illinois Building a Presence for Science

Are you a Point of Contact?

Why not join the over 2000 teachers who are part of the Illinois Building a Presence program?

Currently there are over 2,000 Key Leaders and Points of Contact on this electronic list. In order to receive the next payment from NSTA we need to have another 1,000 Points of Contact. These funds will be used to hold regional meetings and provide professional development tailored to your regional needs at little or no cost to you. Those who attended the 2004 ISTA Conference were treated to a breakfast and networking session on how to make the electronic network useful. Become a part today!

Go to the ISTA website: www.ista-il.org and click on "Yes I want to become a Point of Contact!" You will be taken to the NSTA site and can sign up on the spot - that is all there is to it!

If you have any quesions, please contact Diana at ddummitt@uiuc.edu

Diana Dummitt

Illinois Building a Presence for Science

Contact MaryLou at lipscomb@imsa.edu

Announcing a Building a Prescence for Science Section for the *Spectrum* to showcase the great ideas that you, as participant, have. **Mary Lou Lipscomb** from the Illinois Mathematics and Science Academy has joined the *Spectrum* Editorial Board as the Building a Presence Focus Area Editor. Each issue will feature articles, lesson plans, and ponderings by Points of Contact and Key Leaders. Why not share your ideas with others? You can submit your articles to Mary Lou at lipscomb@imsa.edu

The Friends of Atwood invite you to try: COOL Artesian Water Crystal Fall Springs, Inc, is a new business in the U.P. of Michigan that may have found the best consumable water on the planet for bottling. Friends of Atwood provides assistance to the Atwood Outdoor Education Center. For more information on how you can get involved, contact Regional Director Larry McPheron at 815-978-0251.

Greening Schools

The Greening Schools program is a joint effort between Illinois EPA and Waste Management and Research Center to provide assistance for schools. The program offers:

- free technical assistance to assist schools with lowering operating costs and improving the environmental conditions for occupants
- free training for teachers and building/maintenance staff
- grant funding opportunities

Contact IL EPA's Office of Pollution Prevention at 217-782-8700 or visit the web site at www.greeningschools.org

ISTA Board Buzzzz...

Minutes of the July 12, 2004 ISTA Board Meeting in Bloomington

Present:

Marylin Lisowski	Kevin Seymour	Ray Dagenais
Diana Dummitt	Carl Koch	Andy Apicella
Anna Zuccarini	Randal Musch	Jill Carter
Wes Heyduck	Larry McPheron	Don Terasaki
David Krumwielde	Renee Bearak	Kendra Carroll
Eeva Burns	Gwen Pollock	Melanie Orban

Not in attendance:

Jackie Meadows	Susan Golden	Pam Abbott
Edee Wiziecki	Liza Basden	Rich Mitchell

Marylin Lisowski called the meeting to order at 7:25 p.m. She introduced and welcomed Eeva Burns, ISTA Awards Chair, and Melanie Orban, NSTA Region 12 District Director. Melanie explained her role in NSTA and the recent work by NSTA on inquiry, evolution and NCLB. She asked for nominations to NSTA committees and elections.

President's Report

Marylin reviewed the matrix developed at the June meeting of the Executive Board. The listserv for the ISTAtalk has been changed and is now controlled through the University of Illinois rather than Chicago Public. The executive committee continues to look into the possibility of developing a mini-grant program open to members. The ISTA may be changing accountant firms for the annual audit. The trend of decreasing membership in ISTA is having a negative impact on the financial situation of the organization.

Illinois Council of Math Teachers is interested in having a collaborative convention in 2007. Marylin has received messages requesting a reduction in retired members fees for the annual convention. This will be discussed in the future. Action committees need to be structured to have a dedication to the task and accountability.

Marylin mentioned that she had received many positive and upbeat responses to the reading preconference in regards to both the material presented and the individuals who did the presentations. There was an outstanding success in participation at the preconference.

Vice-President's Report

Kevin Seymour reviewed information on the two regional activities that were held earlier this year. He reminded the Board members about the form for requesting funds for regional activities and the necessity of completing an exit report of the activity. Kevin passed out the guidelines for funding for an ISTA regional activity and a draft of the guidelines for the proposed mini-grant program. Marylin asked if there were any suggestions to clarify the language in the draft. Andy Apicella suggested that the language that stated "ten grants will be awarded each year" be amended to ten grants may be awarded each year". There was a discussion on whether travel costs should be included in the mini-grant and whether the mini-grant should be for professional development opportunities or for classroom use. It was suggested that the mini-grant operate once approved be operated as a reimbursement to be given only after an exit report is provided. This exit report then will be printed in the *Spectrum*.

Feeling Powerless ?

Take an active role in shaping the future of science education in Illinois by running for Director for your region. Contact your current Regional Directors for more information. They are listed on the back cover of the *Spectrum*.

President-Elect's Report

Ray Dagenais reviewed the standing committees of the organization and the Ad Hoc committees. He also reviewed the work of the ISTA Action Plan as well as the reports from the focus groups that worked at the March working meeting and their proposed action steps. Ray also discussed the editorial board of the *Spectrum*. He is still looking for an editor to fill the Higher Education position. The *ISTAction* newsletter is now available on the ISTA website. Gwen Pollock asked for the deadlines for submitting articles to the *Spectrum* editorial board. They are March 1 for the spring issue, July 1 for the fall issue, and November 1 for the winter issue. Ray also reported on the work being done by the planning committee for the NSTA regional. Four strands are being developed for the November 2005 regional at Navy Pier.

Treasurer's Report

Carl Koch presented the most recent treasurer's report dated July 12. He made these corrected to the report: total assets should read $127,298.14 not $97,298.14. For income, membership is $19,208; registration is $24,880; and vendors is $20,020. There is an anticipated $2000 more in registrations for in voices and there will be more income expected from on site registration.

Wes Heyduck asked for a brief comparison of the costs of the Interstate Center to the Pere Marquette. Diana mentioned that all the main meal events have been supported by corporate sponsors. No promotional supplies were purchased for this year's convention. NASA paid for Dr Bushnell's flight from Virginia. His hotel room is comped by the Ramada Limited. No tour workshops are scheduled this year. There is no cost for student guides this year. The fee for overhead projectors at the Interstate Center was $35 each.

Executive Director's Report

Diana Dummitt mentioned the work being done by the planning committee for the NSTA regional. The Illinois Council of Teachers of Math (ICTM) has made contact with ISTAand would like to investigate holding a collaborative convention in October 2007. She asked the Board members to think of questions and concerns linked to this type of convention.

Consent Agenda

The minutes of the March meeting were presented. Andy Apicella reported an error in the login word to reach the ISTA calendar. The login should be one word "istamember". He also reported that there are problems entering the database using the login and password that were given at the March meeting. Marylin addressed the issues around the failure of the regional directors to provide their quarterly reports according to the guidelines. Marylin reminded the Board that she had sent a message out in May that the director reports were due by the end of the school year. Only one regional director had submitted a report by June 25. Some reports were received just two days before the convention. Marylin asked what would it take to get the directors to complete the task. The Board meets three times each year so each director has only three reports to complete each year. The reports should validate the actions taken by the directors over a four month period. Gwen suggested that the reports could be tied to a specific question for the directors to contact the members in their region every four months. This would allow the ISTA directors to become active in fact finding. Renee Bearak said that as adults the Board members should be able to follow the timelines or face being reprimanded. The other directors made no comments on this issue of accountability.

Ray Dagenais added that a major focus of the Board members is to increase membership in the regions and encourage people to join ISTA. Ray also reminded the regional directors that they are expected to find good candidates for the Board elections in January. Wes encouraged the directors to get young members to join.

David Krumwielde mentioned the problems that he encountered with using the database. He said that to get teachers from Chicago to join ISTA that the organization needed to develop a long term projection to be active to increase membership. He said

that it may take extra clerical help and an investment of time and funds for ISTA to get Chicago teachers to become members. He questioned the retention of members and mentioned a problem with marketing the organization to recruits. Region 7 is planning three events for this school year.

Ad Hoc Committees

Gwen discussed the seven action groups that would be meeting on Tuesday afternoon during the convention. These groups are: Funding, Increasing Science Graduation requirements, Assessment Framework, Safety, Community Service, College-University Connections, and Retiring Teachers. Gwen asked if each board member would agree to participate as a recorder in each of the seven focus groups.

Anna and David agreed to go the Funding group; Wes and Andy would go to the High School Graduation Requirement group; Renee and Jill agreed to work on the Assessment group; Kendra agreed to go the Safety group; Larry and Don agreed to go to the Community Service group, and Carl agreed to go to the session on Retiring teachers.

Gwen asked if the ISTA could have a meeting in the spring to match the planned event at the Capitol building. She suggested that each focus group could have a poster session at the Capitol showcase.

Eeva Burns reported that ten teachers would be recognized at the awards reception at the Challenger Center.

Marylin read a report from the publicity committee. Nancy and Marsha will continue with their project to develop materials to promote awareness of the ISTA.

There are 1877 Points of Contact in the Illinois BaP program. There are 193 Key Leaders. The next push will be to get the required number of POCs to maintain funding.

The theme of the NSTA regional at Navy Pier in Chicago November 10-12, 2005 will be **Chicago: World Class Science**. There is no convention planned for 2006. It has yet to be determined if the ISTA should continue with holding one large State convention or three regional conventions. The format of Science in the South would be used as a pattern to plan a northern regional convention as well as a central convention.

Andy Apicella suggested that a 2006 convention should focus on the state framework for assessment in preparation for the 2007 NCLB science testing.

Two weeks ago all Board members were assigned the task by Marylin to prepare an individual plan for increasing membership. These reports were to be discussed at the July 12th Board meeting. Directors who were not planning to attend the July 12 meeting were instructed to send their plans to Diana before July 12. Since it was late in the evening, Marylin asked that each director submit the report to Diana.

The date of the next Board of Directors'meeting will be on October 22 and 23. The location has yet to be determined.

Marylin asked that each of the three major action groups (Publications, BaP, and Membership) that were started at the March meeting find some time at the convention to continue this work and to be prepared to give a short report at the general membership meeting on July 14. The publications group includes Ray, Anna and Kevin. Membership includes Carl, Kendra and Renee. BaP includes Jill, Don, Andy, Wes and Marylin.Meeting adjourned at 9:30.

Respectfully submitted,
Andy Apicella, Secretary

Articles

Science Inquiry with Crystal Radios

Dr. Kevin C. Wise
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A recent conversation I had with Chris, an area middle school teacher, underscored for me a profound but simple "truth" about science teaching. He said that a key to science teaching is "to get the students trying things, building things, testing things". Chris of course, was talking about using inquiry-based instruction in the classroom. Numerous research studies show that, as a group, inquiry-teaching strategies are associated with significant positive effects on student achievement in science. Many experienced classroom teachers, as well, have come to know that inquiry-based teaching strategies are effective for teaching science concepts and skills. Reflecting on what Chris said, I wondered how much we keep this idea in mind and consistently practice it. Do we rely too much on "tried and true" classroom science activities that tend toward the "cookbook" kind? On the other hand are we really willing to go out on a limb, taking our students with us and engaging in some real science investigations and inquiries? Perhaps it was time again for me to venture out on that limb again.

What kind of a "new" science investigation could get us trying things, building things, and testing things? I wanted something not usually found in science textbooks or in the many hands-on science activity books on the market. Besides being something new, the project idea I was looking for needed to meet five criteria:

- Involves a system that could be built with inexpensive materials.
- Can easily be modified for further testing and investigation.
- Lends itself to providing observable results.
- Involves some kind of modern technology.
- Correlates with the Illinois Learning Standards for Science.

There it was, something that met all my criteria for a new classroom project — building, testing and investigating crystal radios.

I was puzzled about what kind of a "new" project might meet all of these requirements until I ran across an idea in what appeared to be the remains of nearly forty year old scout handbook. There it was, something that met all my criteria for a new classroom project — building, testing and investigating crystal radios. This old idea was "new" in the sense that it seems to have been forgotten by science teachers.

The purpose of this article is to explain what a crystal radio is and how it works, briefly describe the history of crystal radios, and offer classroom project tips and investigation ideas to help get you and your students "trying things, building things, testing things" as Chris has suggested.

What is a Crystal Radio?

A crystal radio can be thought of as an energy "transformer" that changes radio waves to sound waves. Along the path of this transformation radio frequency energy, alternating current, magnetism, direct current, and mechanical energy come into play. In a crystal radio the invisible energy of a radio signal becomes observable as sound, usually music or talk, coming from an earphone or amplified speaker. At the heart of a "modern" crystal radio is a diode, a device that plays a key role in this energy transformation The diode is said to "detect" the radio signal. In early versions of these radios a galena crystal was used as a signal detector and thus the name "crystal radio." Manufactured semiconductors, like diodes, are essential elements of all modern electronics.

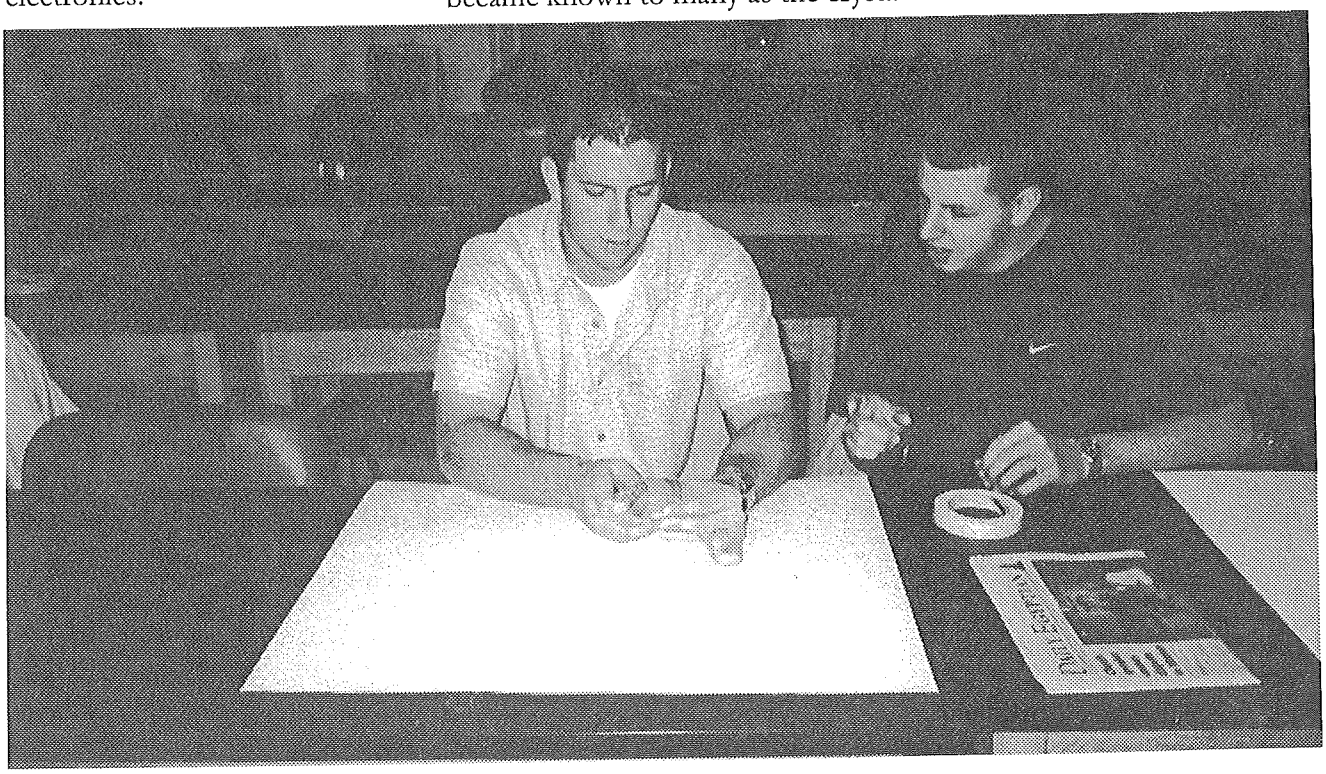
How Does a Crystal Radio Work?

A crystal radio is a circuit wherein electromagnetic energy in the air, from a wide range of radio signals of many frequencies, is "captured" by an antenna wire and pulled through the circuit to a ground. Along the way this energy takes different forms. The current induced in the antenna enters a coil (perhaps in combination with a capacitor) which "selects" a frequency or limited range of these frequencies to pass on to a diode. The diode then detects the radio signal. This radio signal has an "envelope" that might be thought of an electronic ripple representing the voice or talk transmitted by the radio station. This signal then passes to an earphone or amplified speaker that converts this electronic ripple to sound.

For more detailed explanations on how crystal radios work I suggest the articles "How a Crystal Set Works" (Pool, O., n.d.) and "How a Crystal Radio Works," (Davidson, J., n.d.) that may be found at the web pages noted in the references section of this article.

History of Crystal Radio Technology

Crystal radios played a key role in the development and growth of broadcasting and related technologies in the United States. In the early 1900's, after considerable experimentation and testing, it was found that radio signals could be "detected" when a wire was touched to certain crystalline materials. As a result of his experiments with various crystals and crystalline materials and further development of this technology, Greenleaf W. Pickard was awarded U.S. patent No. 836,531 in November 1906 for what became known to many as the crystal radio.



KDKA in Pittsburgh went on the "air" as a commercial broadcasting station on November 2, 1920 with returns from the Harding-Cox presidential election race (Institute of Electrical and Electronics Engineers, n.d.). One can imagine that the public's demand for radio receivers quickly followed. Crystal sets as they were called quickly became a familiar technology to many Americans. Their popular use continued through the two world wars that followed and into the early 1950's. Now they delight hobbyists throughout the world as Internet web-sites on the topic attest.

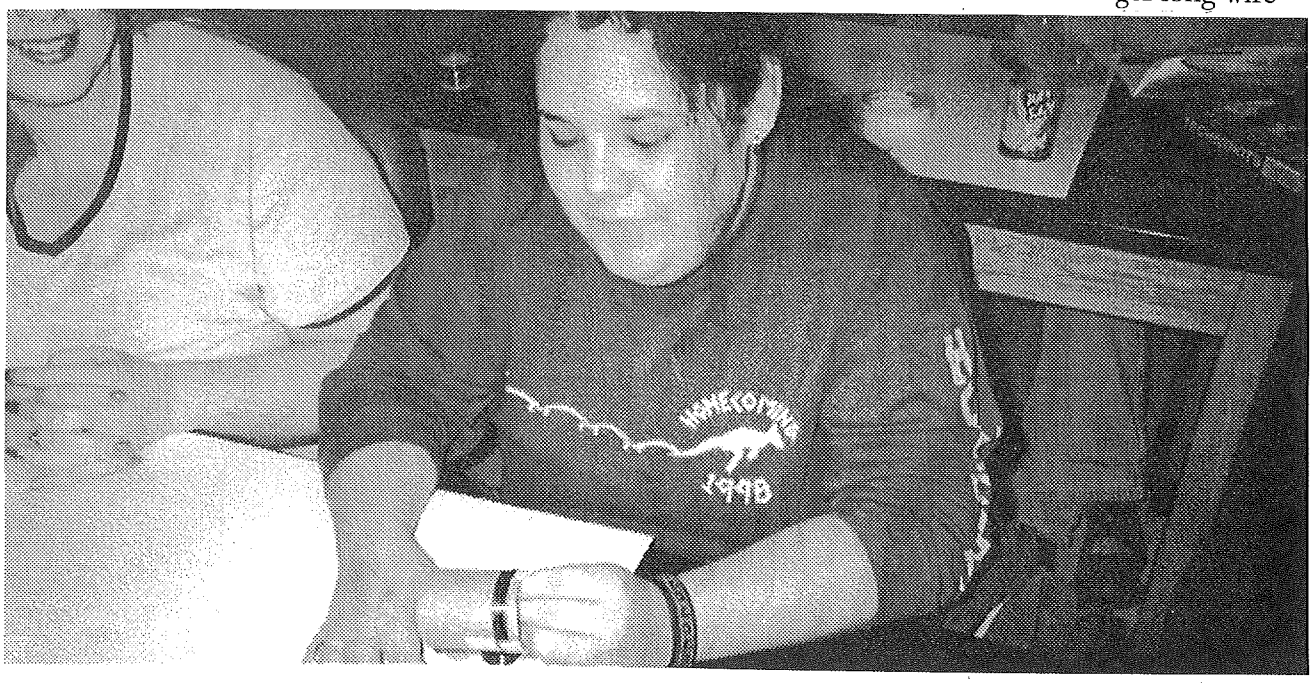
Building Crystal Radios — Kits or Homebrew?

There are two ways to proceed if you want to develop a classroom project around building, testing and investigating crystal radios. One way to go is to buy commercially prepared kits, the other is to gather the materials needed to build the radios from scratch also known as home-brewing. Tips for implementing both of these approaches is described in the following paragraphs.

If you are considering purchasing commercially prepared crystal radio kits do an Internet search for the various styles and kinds of kits available. I've found that often the crystal radio kits that can be obtained locally are either too expensive or in short supply. So far the least expensive commercially available kit (around $6.00) I've used with students with good success is known as the "SK-103." This kit can be assembled and tested in less than an hour. The body of the radio is a plastic chassis and circuit board combined on which the various components are connected by solder-less springs. Also included in this crystal radio kit are an antenna wire, a ground wire and an earpiece. I've found that this kit can be taken apart and rebuilt several times without component failure. Several vendors for the SK-103 can be found on the Internet.

To start, select a simple plan involving the fewest parts and thus the least expense.

When working with commercial kits know that there are several pitfalls for first time builders. These involve the elements of the antennas, grounds, and headphones used with the crystal radio kits. You can assemble and wire a kit flawlessly only to be stumped when it does not work due to one or more of these items. First, I've often found the antenna wire provided is too short to "capture" enough signal energy to drive the crystal radio circuit. You will probably need to use a much longer long wire



A crystal radio can be thought of as an energy "transformer" that changes radio waves to sound waves.

for the antenna than ones typically provided in the kits. Eighty to one hundred feet of insulated stranded hook up wire of 16-18 gauge (not critical) usually provides adequate signal capture. Try hanging the antenna outside a window or tape it to a window if that is not possible. In all cases be certain that the antenna wire does not have any chance of coming into contact with power lines or electrical service at any point. Pull the antenna inside if weather conditions indicate any possibility of lightning. Take no risk in either of these areas.

Many first time crystal radio kit builders don't realize that a ground is as important as an antenna in a crystal radio system. Use a short run of heavy gauge wire from the crystal radio set to the ground for best results. I've found that metal door or window frames in newer school buildings can be used as a ground. In older buildings water pipes that might be found under the sink on a lab table can serve as ground points as well. As with your antenna wire be certain that the ground wire does contact electrical service or potential paths of such. Have a qualified electrician verify that potential points are safe to use if you have any doubts. Also don't use the AC wall plates as a grounding point to avoid shock hazard.

Finally, our experiences show that unless you are very close to a broadcast station or have a very long antenna the ear-pieces typically provided in the commercial crystal radio kits do not generate enough sound volume to make an impressive classroom demonstration. Modern stereo type headphones do not work for this application either due to their low impedance. A good solution is to replace the earpiece provided in the kit with amplified speakers such as those on desktop computers. Simply use alligator clip cables to connect to the input plug on the speakers to the earpiece connections on the crystal radio circuit board.

If you are considering building crystal radios from scratch, search the Internet for the various plans available. To start, select a simple plan involving the fewest parts and thus the least expense. The most basic form of a crystal radio circuit that you and your students can build from scratch involves only two basic parts, a coil and a diode. The coil for a crystal radio can be constructed by tightly winding 26 or 28 gage "magnet wire" around a cardboard tub for most or all of its length and leaving several inches of wire hanging from each end. Figures 1 and 2 show students building crystal radio coils. Magnet wire is available in small reels in most radio-electronic supply stores. If you are planning to build a number of crystal radios and need to keeps costs to a minimum, search the Internet for vendors selling larger reels of magnet wire. The per foot cost of the wire will be much less than of locally purchased wire. You'll also need to buy the diodes if you're building the radios from scratch. Again the Internet will be your most likely source for vendors of the kind of small signal diodes (usually 1N34A type) used in crystal radios. By purchasing the wire and diodes in quantity, taking advantage of amplified speakers that are already on hand, and using re-cycled materials for the remainder of the parts need the per unit cost of a crystal radio build from scratch is a small fraction of a commercially prepared kit.

With a wound coil in hand building your crystal radios consists of constructing a circuit that connects the coil with an antenna, a diode, an amplified speaker and a ground.

Classroom Investigations -Trying, Building, Testing

Whether you try to build commercially prepared crystal radio kits or build kits from scratch you and your students will find this classroom project can quickly go far beyond a "cookbook" type science activity. We've found that when students work together in collaborative groups in building, testing using and experimenting with crystal radios they delve much more deeply into the subject than when it is presented as something to be read about in the textbook or even demonstrated by the teacher.

When building crystal radios in the classroom a number of questions can quickly surface that will challenge students to collaborate on developing background information, asking questions, designing investigations, and conducting experimentation. Some of the questions we heard students ask while working with crystal radios include the following ones.

- Why isn't our radio working?
- What radio stations can our radio receive?
- Do some radios seem to work better than others work?
- Can I change things about our radio to make it work better?
- What is the coil for in a crystal radio and how does it work?
- What is a diode or crystal and how does it work?
- Can we use a real crystal?
- How does a speaker or earphone work?
- What happens if we use a longer or shorter antenna wire?
- What if we use an antenna wire inside the building?
- What happens when we move the direction of the antenna?
- Can we use an earphone rather than an amplified speaker?

Questions such as these can involve students in deepening their knowledge and skills, recognizing and investigating problems, using technology, making connections, communicating and working on teams. These are cornerstones of the Illinois Learning Standards for Science <http://isbe.state.il.us/ils/science.html>. You can build on questions like these questions to engage students with standards and benchmarks in other learning areas as well. Perhaps a driving question for project-based science classroom might be "What is radio?" or the topic of radio might serve as the central idea for the development of multi-disciplinary thematic unit. Inquiries into crystal radios can send you and your students into a real adventure in science by trying, building and testing things as scientists themselves often do.

THANKS TO the students in my fall semester 2003 Elementary Science Teaching Methods courses for participating in this project.

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Inquiry: One Teacher's Experience Including All Students

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Teaching science through inquiry presents challenges that many K-12 classroom teachers choose not to encounter. That is, rather than confront the challenges of having students investigating different questions, using different procedures and not having the handy teacher's manual with prescribed answers is an experience many teachers tend to avoid. Also, the day-to-day realities and demands of managing a regular classroom where middle school teachers, on average, teach five classes of 25 or more students can be a daunting experience. To add an expectation of having science classrooms that center more on students' questions and interests makes it no easy sell to find teachers who will embrace inquiry-based instructional practices. Yet the National Science Education Standards (1992) support the use of more inquiry-based experiences as a means to increase the quality of science teaching and learning.

This paper seeks to position the university professor's (Dr. Jeanpierre) viewpoints and the in-service teacher's (Kristine Marzullo, who is enrolled in the K-8 Masters of Education in a science and mathematics program) experience implementing inquiry for the first time with all of her students. The curriculum of the K-8 Masters of Education in Science and Mathematics Program strongly emphasizes guided inquiry (i.e., 5-e model, discrepant events) methods for science and mathematics teaching and learning.

In the class taught by Dr. Jeanpierre, "Reflection on Instruction in Mathematics and Science," in-service teachers in the K-8 Masters of Education in Science and Mathematics Program are required to not only get their feet wet using guided inquiry-based science approaches, but to take a giant step and provide their students with an open inquiry experience. In an open inquiry classroom the problem, answer, and methods are left open for the student to encounter (Schwab, 1962). Kristine shares her experience of providing a quality open inquiry experience with all 170 of her middle-school students. In the following section she shares her triumphs, challenges, and also anticipates what's next in the pursuit of a more inquiry-based science classroom. Later in the paper, Dr. Jeanpierre shares some of the learning that resulted from this open inquiry experience for this teacher and her grade six students.

In an open inquiry classroom the problem, answer, and methods are left open for the student to encounter

Dr. Jeanpierre suggested that these K-8 in-service teachers use earthworms as a focus of inquiry for a first time open inquiry experience because they are economically feasible, familiar organisms, and fairly easy to keep alive. Yet, teachers had the liberty to self-select any organism for their open inquiry experience.

Kristine's First Open-inquiry Experience

At the end of the semester, Kristine presented a written report of her experience using open inquiry with her grade six students. Presented in this section is a progression of events Kristine experienced as she used open inquiry with all of her students. First, she had to figure out a way to have all 170 students involved in the open inquiry. As the teacher, she went online and did some of her own research about earthworms to see what she was getting herself into. In order for Kristine's students to write good questions to investigate, she decided they needed to do some of their own earthworm research, too. So, she arranged the means to obtain the research resources needed to help increase students' understanding of the earthworm's history, anatomy, habitat, and care, among others. The media specialist at the school located reading-level appropriate books and websites for Kristine's students. Due to the large student-to-computer ratio in the school, she could not schedule extensive computer research time for her students. Therefore, Kristine brought the media center to the classroom. Armed with books on various invertebrates, including earthworms, she set up a classroom research center. From the online materials that the media specialist provided, she picked out appropriate content articles and created earthworm information folders for each student table group in the classroom. She also created a hand-out with an overview of inquiry research procedures outlined for the students (Appendix A).

After organizing appropriate resources and setting a research procedure outline, Kristine was prepared to share the earthworm inquiry project with her students. To learn more about earthworms, Kristine organized the earthworm inquiry research into four broad topics: *classification information, habitat, anatomy, and food.* Students discussed each topic and then decided who would be responsible for researching each broad topic. Kristine provided the students a hand-out to record their notes. After students had completed their topic research, they reconvened into their groups and presented a report on their findings to the members of their table group. It took three class periods for students to complete the individual topic research and share their findings with their table groups. At the completion of their individual earthworm research, many students voiced that they believed that they had become earthworm experts of sorts!

In order to make sure that all students had an opportunity to share questions that persisted about earthworms Kristine instructed them to write out these questions for homework. During discussion time on the next day the students realized that not knowing the answer is part of the inquiry process. Kristine's next challenge was to get each student table group to decide which question they wanted to share with the class as a possible open inquiry investigation. To facilitate the process of selecting a question, she wrote a list of topics on the board from each table group's question.

During discussion time on the next day the students realized that not knowing the answer is part of the inquiry process.

Students asked a variety of questions such as: "How do worms move on different surfaces?" "How do different foods affect the growth of earthworms?" and "How do the different environments the worms live in affect them?" With all five classes, Kristine repeated the process of having table groups identify an open inquiry question they wanted to investigate. The end result of each table group's inquiry question was to generate a list of five to six questions from which the whole class would then select a class open inquiry question. Each class voted on which question they were most interested in investigating.

In all five classes, Kristine's students had similar questions such as how do different foods affect the growth of earthworms? After the tallied votes each class chose a different question to investigate. At this point, Kristine felt a bit overwhelmed. Because this was her first time using open inquiry, she did not know if she could effectively pull off facilitating five classes doing five different open inquiry investigations during the same semester. Yet, she was determined to proceed.

Next, Kristine had each class spend time rewriting their investigation into an appropriate researchable question. She led a discussion about what variables they would be manipulating, and what they wanted to measure. One of her classes wanted to measure how different types of food affected the growth of the worm. The students recognized that they would be manipulating the types of food. One student suggested food items like grass clippings, because her dad just recently cut the lawn and she thought that it was a readily available food source. Another student suggested herbs from her mom's herb garden as a food source. Finally, another student suggested fruit because fruit was readily accessible at his house. Students tended to select food sources based on availability.

The students also recognized that they needed to control for different variables. They decided that the worms should all be placed in potting soil, in the same part of the classroom, and given the same amount of food to eat. Kristine also let the students decide how they would make their measurements. They decided that measuring the length of the earthworms with rulers would be how they would collect their data. Students also decided that they would measure and feed the worms each day.

The next step in the inquiry process was for students to use class discussions on variables to write a class set of procedures for the inquiry project. Kristine informed students of materials she had in class that they could use in their inquiry investigations. At the end of the procedure development process, she did review procedure processes with the students using a discussion format. If Kristine felt that something was missing in students' procedures, she used questioning to prompt the students to think about what was needed in their design. Students soon realized what they had forgotten in the design of their experiments. For example, in one class the students forgot to include how and when to feed the worms in the procedures. This particular class was measuring to see how the environment the worms were living in affected their growth so they were focused on the types and amounts of soils they were using. Kristine posed a question to this group, "If we are conducting the investigation for two weeks, what other factors do we need to consider?" A student responded, "They are alive! We forgot to feed them!" The students then devised a feeding schedule and included it in their procedures section. Class discussions on selecting variables and writing design procedures took two class periods.

The students were now ready to conduct their two-week open inquiry. At this point, Kristine facilitated the development of a data collection and feeding schedule for the group's rotation. At the beginning of each class the appropriate group would collect data and then post it on the board for the other students to record in their journals. This schedule allowed all of the groups to take part in collecting the data, or feeding the worms. As time progressed, some students noticed discrepancies in their research procedures. For example, one class became aware of inaccuracies in the measurements being taken. The students in four of Kristen's five classes chose to use length as their measurement of earthworm growth. In all four classes students experienced a similar problem. The worms would sometimes scrunch up, or sometimes would completely stretch out when they tried to get their length measurements. This caused major fluctuations in the earthworm measurements. On their own, students decided that for future experiments length was not the most accurate way to measure earthworm growth. In one of the classes, students suggested that massing the worms to find the change in growth would be a more reliable measurement of earthworm growth.

Finally at the end of the two weeks, Kristine's students, in groups, wrote reports that included their question, inference, hypothesis, procedures, raw data, data analysis, and conclusion. The students' conclusions included the support for their hypothesis, the importance of conducting such an experiment, problems encountered, and what future studies they would like to conduct. One of the future studies that many students stated an interest in was to do the same experiment on measuring the growth of the earthworms with different food types, but by massing the worms they could determine a more reliable measure of growth. Kristine assessed the students' inquiry reports using a rubric that she created earlier in the school year (Appendix B).

The Inquiry Learning Experience

After the guided inquiry lessons and the open inquiry experience, Kristine stated, "I am ready to include more inquiry based learning in my curriculum. I was scared to death to attempt this project with all of my students. At first, it was an overwhelming task, because I wanted to include all of my students and did not have a previous open inquiry teaching experience. I didn't just want to pick one class and let them try the earthworm inquiry and not provide all of my students with this exciting learning opportunity." Kristine now has confidence in both herself and her students' ability to effectively handle open inquiry experiences. She said, "I learned that with adequate planning and good classroom management, I can successfully conduct open inquiry with 170 middle school students and a few dozen worms".

The learning gains in Kristen's students were immeasurable. She believed that the learning gains from this open inquiry experience were incredible for the teacher and students. The positive team work that students demonstrated was superb. Also, she observed a great deal of learning taking place when walking around the room and hearing the students communicating amongst themselves and solving design problems. Many of Kristine's students wanted their final reports to look professional. They took it upon themselves to learn to use their home computers to produce a more professional looking science inquiry report complete with data tables and color graphs. Kristine learned that in future inquiry projects, she should provide the students with a list of various materials that were already on- hand before they begin the inquiry. By providing students with a list of available materials, it can reduce the costs involved when conducting many different inquiry projects. With just a little guidance, Kristine's students produced a final project that they were all proud to share.

Conclusions

The requirement that teachers use open inquiry as part of this university class, provided Kristine with the necessary stimulus to try open inquiry. She and her students learned a great deal throughout the inquiry process. Kristine realized that she needed to closely monitor students during the development and implementation of their research designs, but she gave them the freedom to make their own design decisions. Students soon found out what flaws they had in their research designs. Yes, this learning experience was invaluable, and Kristine is confident that she can provide even more inquiry opportunities to all of her students.

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National Science Standards Science as Inquiry — Content Standard A Students should demonstrate the following abilities: identify questions that can be answered through scientific investigations, design and conduct a scientific investigation use appropriate tools to gather, analyze and interpret data, construct explanations and models using evidence, and think critically and logically to make relationships.

Appendix 1

Earthworms

Objective: To learn more about the invertebrate group of earth worms.

Part 1:
Procedure:

1. Assign each group member a topic to research about earth worms.
   Topics are
   Classification (kingdom, phylum> species; related animals, etc)
   Anatomy (body parts and functions)
   Habitat (where are they found – geographically, what kind of environment do they like? etc.)
   Food (what do they eat? how? etc.)
2. Research the appropriate topic using the handouts, books, internet, etc.
3. Share your findings with your group members.
4. Record your findings in the appropriate space below.

Earthworms Info

Classification :

Anatomy

Habitat

Environment

From what you have learned, write 2-3 questions you would like to research in an experiment involving earthworms.

1.

2.

3.

Appendix B

Rubric for Lab Report

Lab report component	5	3	1
Question	Correct wording- **How Does...?**	Present, but incorrect	Missing
Inference	Correct **I think...because sentence**, correct topic	Present, but wrong or incomplete statement	Missing
Hypothesis	Complete **If-Then statement,** correct topic, matches inference	Present, but wrong or incomplete statement or correctly written hypothesis but does not match inference	Missing
Procedures	Written in a list form, numbered, and all steps are present	Incomplete list	Missing
Data/ Observations	Data table present, drawn with a ruler, correct title, labels and all measurements are present and labeled correctly	Data table not drawn with a ruler, missing or incorrect titles or labels; measurements missing or not labeled correctly	Missing
Graph	Contains correct type of graph, drawn with a ruler, correct title, labels, and scale; Data correctly represented	Wrong type of graph, not drawn with a ruler, incorrect or missing title, labels, or scale; data incorrectly plotted	Missing
Conclusion- Hypothesis	Correct sentence- includes support/does not support and why	Incorrect or incomplete sentence	Missing
Conclusion- Inference	Correct sentence states how the results compare to the inference	Incorrect or incomplete sentence	Missing
Conclusion- Mankind	Correctly states importance of lab	Incorrect or incomplete sentence	Missing
Conclusion- Procedures	Correctly states any problems that occurred	Incorrect or incomplete sentence	Missing
Conclusion- Future studies	Future study question written in a **How does** form	Incorrect or incomplete sentence	Missing
Presentation	Typed or written in ink neatly	Written in pencil, many cross outs, difficult to read	Missing
Spelling	1-3 spelling errors	4-6 spelling errors	7 or more
Heading/Title	Proper heading and title present	Incomplete or incorrect heading or title	Missing

Creatures of Habit

Dr. Richard A. NeSmith
Spectrum Middle Level Editor
Department of Early Childhood, Elementary, and Middle Level Education, Eastern Illinois University

I wonder what our (your and my) junior high school/ middle school students think as they sit in our classes.

Do you recall sitting in that junior high school science class? I remember that first year — the building and the mild-mannered graying gentleman who taught it. I remember something about frogs? Maybe we dissected them??? My group moved on to eighth grade. Again, we were in the same building, though in a different room and with a different teacher. Here, I remember even less. Actually, all I really remember (seriously) was his "sex education" lesson where the girls were moved to another room and we guys remained. This teacher had some really ridiculous analogy regarding "wearing your socks while swimming". Not going to explain that one, but it was the dumbest thing us guys had ever heard. After two years of Irrelevant Science 101 and 102, it was easy for me to opt out of science in ninth grade for "Ag". Even against my wishes, I could have learned some science in the agriculture class, but it was seldom, if ever, taught.

Not much to report from one having spent over 500 days, or some 3000 hours, occupying the halls of a junior high "educational" institution. Now, don't get me wrong, I was considered a good student. But, whatever it was that was being placed on my plate was not very appetizing, desirable, or developmentally palatable. And, that was before the era of Nintendo, Sega, and the other multimedia indoctrinations that eventually produced a new-fangled group of students.

I wonder what our (your and my) junior high school/middle school students think as they sit in our classes. Sure, they will remember the buildings, their friends, and other exciting events, but will they remember anything from our class? It's not necessarily a matter of ego or pride to want to be remembered, but our educational nature wants to make a difference. That, for the most part, is what has attracted you and me to the vocation of education, anyway. Obviously, most of us could make a lot more money in some other profession. But, it's not about money. It's about the students. It's about *teaching* students concepts that they need to understand in order to have a solid foundation for life, as well as our desire to instill in the drive to be a life-long learner.

Little wonder when I finally graduated from high school (with my high school science experience being just a tad better than my junior high experience), that I had no idea what area of teaching to enter. To make a long story short, I decided to become a history teacher. No, I did not become a history teacher because I wanted to graduate with a degree in an area where I could find work — and that definitely wasn't in history at that time. In fact, as you can guess, the greatest need (and still is) in education is for dedicated science and mathematics teachers.

My background ruled out the latter and so I took my mediocre understanding of science and entered a science education program. I fell in love with it. Between that and paying for my own tuition, I began to get excited about all that was "out there", especially in the area of

Oftentimes a great deal can be accomplished with just a few changes.

life science. I much prefer the living to the non-living. I found myself reading and studying my college science textbooks and simultaneously reading other science textbooks. Somehow I began to regain that which I had wasted in secondary school. I will be honest and tell you that it was science that I first fell in love with and teaching came later. This seemed quite natural to me (natural does not necessarily mean "easy"), and the teaching flowed out of the excitement of what I was learning. Even to this day, and please don't tell anyone, I read science textbooks for "pleasure" reading.

I entered the profession of teaching science with lots of zeal and excitement, and determination that I would provide my students with the greatest opportunities I could to learn science. I have not always measured up. Sometimes my expectations were more fantasy than reality. But, thank goodness, experience doesn't have to be wasted and I have learned a great about what "teaching" is all about.

Several times I have contemplated my first year of teaching; seventh grade life science. I really wonder if I had any idea what I was doing. It should make us cringe just a bit to wonder what became of those laboratory guinea pigs. By my second year I was beginning to see some progress — maybe I was actually learning *how* to teach. Even with all the helpful literature and research available to us about teaching strategies, there is one very green monster that stalks you and me, every day and every year, as teachers, The green monster (for you baseball fans, I am not referring to Fenway Park in Boston!) is that small, but important reality brought to our attention by several dedicated researchers. This stalker, if I may use this term, is the well-established reality that *we tend to teach as we were taught.* This might be great *if* you were taught by a wonderful role model, but most of us were not. Why is this such a "green monster"? Well, if my experience as a student in junior high school science consisted of a lot of "empty space" in my mind, then I probably did not learn much, though I was considered a "good" student.

This era of my life occurred in the 70s and the educational pendulum was well into the concept that "learning is a transfer of knowledge" practice. Obviously, something happened regarding me and that alleged transfer. Could it be that my teachers, probably like many of yours, stood up in front of the classroom and gave the old pedagogical 1-2 punch: lectures and worksheets? The green monster that stalks me and you is that though we want to improve our methods of teaching, and add innovative strategies, even the most creative falters when they become anxious, driven, frustrated, or exhausted. We fall back into the habits of the past and we will teach as we have been taught. The remedy for me has been to try to monitor my "delivery" so as not to fall in the rut and drown (or worse, drown my students). Students want and need fresh approaches; a mixture of various kinds of teaching tactics. If variety is the spice of life then students need spice cake (yum, yum).

Like you, I have had my share of success stories with students — as well as my not-so-successful stories. After having taught for just under a decade, I found myself heading a science and math department in Western Australia, where it seemed I became more and more involved in helping teachers to become more effective at teaching. It certainly wasn't that I had all the answers, but we always managed to see improvements at various levels. There is a lot of satisfaction in seeing students improve learning and teachers improve teaching. One of the most useful reminders to improving both is to be conscious of falling into the rut of teaching how you were taught. It's almost natural to do so, especially when you become too tired, too discouraged, and stay in the survival mode too long. I suppose it was this chapter in my life when I began to see my mission expanding to include sharing with other teachers that which I have learned, experienced, and read regarding education.

The passion for science education continued to grow and develop into an opportunity to teach and share with pre-service students. My first higher education job was, strangely enough, secured via the Internet, and my interview with the search committee of eight was held one night at 11 o'clock, Western Australia time. I suppose what I like most about science education at the higher education level is that I actually get to pursue my interests — and they pay me for it! Pretty cool, huh? At this time, my interest includes completing my second science textbook: *Human Biology II: Entering the 21st Century*, to be released in '05. I also have an interest in student and teacher perceptions of effective learning and teaching, classroom environments, brain-based learning, use of technology in the classroom, and ways to improve the teaching and learning of science.

Even at the higher education level, I find that the green monster lurks through the halls. With more than ever to do, I discover that there is that constant internal "fight" that wants to "cover" information and that side that wants to emphasize concepts. I joke with my middle level pre-service teachers that if they want to *cover the textbook* they should just have their future students put a grocery sack over it. That'll cover it. They get a laugh out of it, but pretty soon I will have to "upgrade" my remark since paper bags are almost extinct. In our age of information explosion, we *have to* teach for understanding. What was acceptable 25 years ago will not meet today's requirements. I find that today's pre-service teachers have a lot of challenges besides just teaching. We can not afford to have them leave the College of Education unprepared.

In closing, allow me to make a few simple suggestions for keeping the green monster at bay. First of all, get the rest you need. You cannot do everything all of the time. But you can calculate your priorities. Effective teaching requires a lot of creativity, but when you are tired you will not be creative. Frequent fatigue, while unhealthy for you, will also place your students in danger of wasting their middle level years, and failing to get the foundation they need to succeed in the future. Second, read afresh. Subscribe to a few good educational journals and read them. Reading is not only a form of "exercising" the mind but also a means of providing you with fresh oil. Reading can refresh your mind like cold water can refresh your thirst. Third, realize the importance of your job. You have those students (in their waking hours) longer than most parents. Why go to such effort if you are not able to help them learn new and exciting scientific concepts? Meaningful learning can be exciting and by it's very nature, practical. Finally, realize that we are creatures of habit and therefore, there is a tremendous *tendency* to do things (i.e., teach) as we have experienced them done to us. This does not mean that lecture or worksheets, or any such practice, is wrong — it just means that too much of *any* practice or strategy is poor pedagogy. Mix up your strategies and your methods. Seek to reach all students. Use variety. If the thought of any particular lesson is boring to you, then it will be boring to your students. I tell my science education teachers-to-be; *when you enjoy teaching, students enjoy learning.* Oftentimes a great deal can be accomplished with just a few changes. Small changes can sometimes have big effects. So, climb up out of that rut and let's have another go at it. Shock them with creative lessons. Run that little green monster back into the dark closet, and when it visits you again, you'll know what to do.

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Service Learning and the Science Instructor

Deb Perryman

Elgin High School Environmental Science Teacher, State Service Learning Mentor and 2004 Illinois Teacher of the Year

Service learning is not community service..

What is Service Learning?

Since being named the 2004 Illinois Teacher of the Year, I have been traveling our state talking about the attributes of service learning. Naturally, any good story must be told from the beginning. Eight years ago I was contacted by the US EPA, and asked to feature some of my classroom projects in a booklet that would detail watershed based service learning. Naturally, I was very flattered, but told them that I didn't think I used service learning. It turned out that I was a practitioner of service learning, but I had absolutely no idea that it had a name. So, let me give you a definition and perhaps you too will find that you are a practitioner.

Service learning is a teaching strategy in which students explore an aspect of a community issue. The teacher works to tie the exploration into a project that addresses the curriculum. For example, picking up litter near a creek on a monthly basis can be related to The Clean Water Act and therefore fits my environmental curriculum. The students are exploring a community issue (i.e. litter and its affect on creeks), while meeting State Learning Standards (i.e. Federal Legislation). My long-term goal as their teacher may be for them to find the source of that litter and perhaps outline a permanent solution to the litter problem.

Service learning is not a stand alone course; it is a teaching strategy that allows you to connect a student to the real world pragmatism of your curriculum. Are you tired of hearing students' ask you "When will I ever use this in the real world"? Help students make this connection by allowing them to solve those problems facing your community. After all, when is science *not* used to solve problems?

Service learning is not community service. Although community service projects are wonderful and do provide positive student outcomes, they are not tied directly to curriculum. If my environmental science class identified the need to provide warm clothes to children in our community, and organized a clothes drive to address that need, they would be involved in a community service project. To tweak this project into the service learning category, we would collect warm clothes made from 50-100% post consumer waste. This would provide an outreach opportunity to teach our community the importance of buying products made from recyclable material and would enhance our Landfill Unit.

You only have to look at *The National Training Laboratories*, Learning Pyramid for Average Retention rates to understand the need for incorporating service learning into your science curriculum. According to the Learning Pyramid students retain 5% of what you tell them, 10% from what they read, 30% from audiovisual sources, 30% through demonstration, 40% from discussion groups, 75% from practice by doing and 90% by teaching others. I utilize service learning because it emphasizes the last four teaching strategies mentioned in the pyramid. My own experience has shown me that the last statistic "teaching others" is accurate. Think about everything you have learned in your curricular area through out your career as a teacher. That marks an incredible learning curve. So why not involve students in teaching?

There are two other dimensions to service learning that are important to explore, reflection and community impact. First, studies have shown that reflection is the key to a well designed project. In fact, many of those studies have gone so far as to say that reflection is the most important component. Think about the skills required to reflect. You must be able to make observations, compare and contrast your experience and relate your experience to past experiences. Reflection allows the student to internalize "what they did", with what was learned. Since the learning is internalized, it becomes important, practical and defined. Second, students participating in service learning are making real contributions to their school and community. Not only are the students' developing self-worth, but their community is developing a different perspective of our young people. Once the community has had the opportunity to interact with students', they can no longer marginalize those young people. They become legitimate members of society, not tax burdens. You will find that the community will become more supportive of you as a teacher and of your school.

How Do You Start a Service Learning Project?

So if you are reading this section, I guess I convinced you that service learning is a fabulous and affective teaching strategy. Good, because it is and getting started will be less painful than you think. It is actually as easy as creating an invitation to a party. You have to think about who, what, where, when and how. Who do you want to be involved? What issue do you want your students working on? Where and when will this project fit into your lesson plans, and the community? How will this fit into your curriculum and how will the project be evaluated? As you might imagine, the first project is the most difficult. Once you get through one, I dare you to NOT find additional projects!

When answering the organizational type questions, keep in mind the following from Asler, Standards for School-Based Service Learning:

1. Preparation and reflection are essential elements in service learning.
2. Students' efforts should be recognized by their peers and the community they serve.
3. The service the students perform must make a meaningful contribution to the community.
4. Effective service learning integrates systematic formative and summative evaluation
5. Youth are involved in the planning

Now it is time for you to identify some possible service learning Projects. These ideas can come from any where, the local news paper, a city council meeting, a special interest or your text book. Open your senses to the community and start looking for opportunities. I also highly recommend talking to municipalities. Public Works Departments, for example, are mandated by Federal Law to create and implement outreach programs specific to storm water (Water, now there is an issue!).

Counties also have a wide variety of agencies all required to meet the needs of too many people, with too few resources. I have found that when I walk into an office and express an interest in an agency's needs, not only do I walk out with a service learning project, but I walk out with a partner for my classroom. This is the key to any successful program. I have over 100 partners and agencies at my disposal and these folks help me with everything including chaperoning, equipment, supplies, guest speakers and funding. As you continue to develop Service Learning projects, you will continue to gain partners for your classroom.

Once you have identified a community need that fits into your curriculum, it is time to plan. The following is a "who, what, where, and how" check list for planning that has been adapted from materials of the Georgia Department of Education.

WHO...

Will be responsible for planning and implementing the project?
Will be the primary beneficiary of the service?
Will be the partners in the project (remember, this is key)?
Can contribute to the project's success?

WHAT...

Needs to be accomplished to initiate and complete this project?
Academic area will be targeted?
Are the service needs to be met?
Is the timeline for the project?

WHERE...

Will the project take place?
Will the funds for the project be found?

HOW...

Will the success of the service be measured?
Will the progress in learning be measured?
Will the news of the project's success be shared?
Will the project be improved the next time it is done?

State and Federal Resources at your Disposal

Service learning is not new and many people have put stock in its merits, so you have many resources at your disposal.

Lt. Governor Pat Quinn definitely sees the merits of service learning. He has joined forces with the Cesar Chavez Foundation to organize the **Annual Cesar Chavez Day of Service and Learning**. This initiative is designed to encourage an ethic of service and civic responsibility in young people. Lt. Governor Quinn is asking all public and private schools in Illinois to join him in a celebration of Cesar Chavez's contributions as a leader, organizer and nonviolence advocate for everyday people. During the week of March 31 (Cesar Chavez's birthday), create and implement a service learning project of your own and register the project with the Lt. Governor's office via this website: www.ChavezServeandlearn.il.gov or call Peter Newell or Lisa Hernandez at (312)814-5220.

The Illinois State Board of Education is also here to help you with any need for your project. They have a multitude of resources from a well designed website (www.isbe.net/learnserve), to workshops and an annual state conference. Of special note is the State's system of Service Learning Leader Schools and Mentors. You can call any Leader School and make an appointment for a site visit. You can also arrange to have a State Mentor come to your school, visit with your community and help you design a project. What could be better than learning from the best service learning practitioners in the State? The ISBE Learn and Serve Program also have funds available for school districts wishing to develop service learning projects. The State Coordinator for Service Learning is Dr. Patricia Poole, and she can be reached in her Chicago Office at (312)814-6044 or email at ppoole@isbe.net.

The Illinois Resource Center also offers workshops and training in the best practices of service learning. They maintain a database of service learning information for Illinois and publish a quarterly magazine called *Learn and Serve in Illinois.* The IRC can distribute informational packets about service learning and maintain an extensive library of service-learning books, pamphlets and videotapes that you can check out. The Center also provides more active assistance by organizing annual meetings and conferences and visiting local schools to explain service learning or review existing programs. If funding is your concern then the IRC can help school districts apply for School-Based Learn and Serve Grants Their website is www.thecenterweb.org and the new Learn and Serve Coordinator is Mike Mangan. You can call Mike at (847)803-3535 or email him at mmangan@thecenterweb.org

Other Illinois Resources

Illinois Commission on Volunteerism and Community Service

Illinois Campus Compact
www.mccoy.lib.siu.edu/p16/slopps.html

National Organizations

Corporation for National Service/Learn and Serve America
www.nylc.org

National Service Learning Clearing House www.servicelearning.org

What Service Learning Has Done for my Classroom.

I have found service learning to be the great equalizer of my classroom. It doesn't matter if a student is gifted or average, below poverty level or wealthy. This is a teaching strategy that truly engages a student regardless of race, religion or ability level. Many teachers say to me "Sounds great, but I have LD, BD or ESL kids in my classroom". I usually want to say "So?" — but that wouldn't be very nice of me, and it can be a legitimate concern. Learning disabled and behavioral disordered children can participate in service learning projects with great success. Even unmotivated children respond positively to service learning projects. I have noticed a marked improvement in attendance and attitudes when students are participating in service learning projects.

I know what you are thinking — that works for her school and district, but it will never work in mine. School District U46 is the second largest in the State, behind of course Chicago Public Schools. Elgin High School is considered an urban school, despite being tucked away in the northwest suburbs of Chicago. We serve approximately 2200 students who speak 28 languages fluently. Our last State Report Card states that 38% of EHS students are receiving free and reduced lunch, and we are on that dreaded "Academic Warning List". Our community didn't always receive our students well. Of all of the school's in District U46, Elgin had the poorest reputation. Many in our community considered our young people "hoody-wearing, gang banging fools". Our staff has been working very hard to build a bridge linking the community and our school. Service learning has been an important support beam in that bridge.

During the 2003-04 school year, my Environmental Science students logged over 1200 hours, teaching nearly 6,500 younger learners about Illinois' natural history. This does not include our environmental literature volunteer program or our community outreach programs. 1200 hours, folks, outside of class time engaging themselves in science! My students became so used to identifying and addressing issues in the community, they began bringing projects to me. (This is actually my goal by the way. The truly authentic service learning projects come from the students.) I mentioned earlier that EHS is on the Academic Warning List. Two years ago, our local newspapers listed the schools on this list. One of my students brought in the article and showed our class that of the eight schools on the list, five fed into EHS. The students became very upset and started to talk openly about what this list meant for our school, community and themselves. They seemed most upset about the reading scores and asked if they could "do something" about it. They formed a research team and began looking into the problem by interviewing local reading experts and researching educational journals. When they reported their findings, they found that the number one determinant of whether or not a child would be a good reader was if that child had been read to aloud. The answer didn't lie in fancy books, or tons of money invested into a reading curriculum. Did the parents, and grandparents, take the time to read aloud to their child ?

New questions arose from their finding. Did the family have the resources to read aloud to the child ? Could the parents and grandparents read? We brainstormed several possible reasons and attempted to come up with solutions for each. That is where I came in as the teacher. I had them select one aspect of the problem that was doable. My students decided that they could develop a volunteer reading program. They spent a lot of time planning and finding partners and funding for the project. My job was to find a way to have this project appropriate for science. My stipulation was that they had to read a children's literature book that was linked to science and they had to create an activity that would reinforce the scientific principal found in the book.

My students decided that they would need help in terms of training in order to read aloud to an audience. They enlisted the assistance of three partners, a pre-school director, the community Readership Coordinator and a local book store owner. All three of these ladies came to EHS and held training sessions for students who wanted to volunteer as readers. The high school students learned how to hold the book, what to do if a child gets "crabby", and how to make the book interactive. A second team of partners came in and helped the EHS environmental students develop activities that went along with the book they selected. The end result is a small army of EHS students who read aloud in elementary classes, libraries, nature centers, pre-schools and day care centers. They are volunteering after school, on weekends and even on days they are off from school. If you are in a unit district, you know that sometimes the high school students are off, while the middle and elementary students are in session. My students where even volunteering during this time.

Your next question is sure to be, how did you grade that? I require my environmental science students to create a portfolio each semester. The portfolio is worth 150 points. I have created a menu of items that they can select from in order to earn their points. Community projects are worth 25 to 30 points. To get the points, the student must turn in a lesson plan complete with goals, objectives and State Standards met. They also have to fill out a reflection sheet that details how the lesson went, how it will be improved and how participating in the project made them feel. I assign points according to their lesson plan and reflection sheet. This year we are hoping to add an evaluation portion for the classroom teacher or organization to fill out about the high school student's performance. We aren't sure if we will assign points based on the comments, or just use it to coach the student in lesson preparation.

Not only are the students performing a meaningful service, they are having fun, building their college application and LEARNING SCIENCE. I also think they will, as high school students, see the importance of reading aloud to their children, when that time comes. Perhaps that will be the component to creating a new reading paradigm in Elgin. Who knows!

Won't you join me in moving the young people of Illinois to action? Learn more about service learning and how you can implement this very effective teaching strategy this school year.

Save the Date! October Eight!

Our annual Fall meeting of the *Illinois Association of Chemistry Teachers (IACT)* will take place on

October 8th, 2004

at Illinois State University in Normal, Illinois.

This year's conference will feature ***Mr. Robert Becker*** from Kirkwood, Missouri. Mr. Becker has presented at a number of national chemical education conferences and has a wealth of ideas to share with us. You can see some of his creative ideas at http://chemmovies.unl.edu/Chemistry/BeckerDemos/BD000.html or maybe you've purchased his books and videos from Flinn Scientific.

Mini Ideas

Water Purification Lab Investigation
Part I: Water Clarification

Abour H. Cherif, Ph.D
DeVry University – Oakbrook Terrace
Cynthia L. Gerstner, Ph.D, Gerald E. Adams, Ph.D., and Charles Cannon, Ph.D
Columbia College Chicago

Before You Start:

1. What is the main source of the water supply in your city?
2. On average, how many gallons of water do you consume per day and per month?
3. On average, how much do you pay for your home water bill per month?
4. What are the processes that the water goes through before it reaches you home?
5. What are the two main mechanisms that the planet earth uses to balance the water that goes up with the water that comes down over the earth?
6. How do these two mechanisms work to help planet earth balances its water budget?
7. Do the two mechanisms that you mentioned in answering the above question also act or hold for individual geographical areas on the planet earth?
8. How do the differences that occur in the rates of evaporation and precipitation in individual geographical areas affect the characteristics of various areas on earth?

Introduction:

We live on a water-covered planet. Three-quarters of the earth's surface is covered by ocean. Furthermore, life began in an aquatic realm, hundreds of thousands of species still live in water today and all life forms need water in order to survive and maintain life. However, of all the earth's water, the portion that is available for humans use is very tiny. Today however, the rapid increase in the human population and the new forms of human activities have created two major problems. First, the level and the rate of pollution in the existing salt and freshwater of the planet has been increasing. Second, the amount of the water that has been available for human consumption is decreasing.

Water is vital for living organisms for many reasons. First, living organisms are composed mainly of water (from 50 %- 99%). Because of this, most living tissue acts as the medium for the chemical reactions within the body's cells. Second, water has unique physical and chemical properties without which most living organisms could not survive. These properties include the ability of water to dissolve many different kinds of compounds (water's solvent property) including most of life's essential nutrients. Water molecules have the tendency to bond with other water molecules (water's cohesive property), the tendency to bond with other kinds of molecules (water adhesive

property), the tendency to move upward in a narrow space against the pull of gravity (capillary property) and the tendency of molecules at the surface of liquid water to cohere to each other, but not to the molecules of the air above (surface tension).

Water also has a high boiling and high freezing point. Water's ability to absorb a lot of heat before it becomes gaseous makes it a good evaporative cooling agent. Water also has a lower density (weight per unit volume) as a solid (ice) at 0° C than as a liquid at 4° C, a property that enables ice to float over the liquid water of lakes and rivers enabling aquatic organisms to survive in winter.

In this set of lab investigations, you will conduct experiments to treat water for drinking purposes. The treatment of water for drinking has several basic steps: clarification, disinfection, and taste and odor removal. Clarification is the mechanical and the chemical processes of the removing of sediments and the suspended particles from the water. Disinfecting is the process of killing harmful bacteria by adding chemicals such as chlorine into the clarified water. Taste and odors are removed by adding chemicals to disinfected water and/or the disinfected water is passed through special filters to remove any undesirable taste or odor

Safety Procedures:

Please do not drink the filtered water you make in these lab investigations.

Materials (per group):

Red food coloring, 1/2 cup of dirt, dead grass, small pieces of dried leaves, alum, ammonia (non-soapy), water, sand, cotton, 2 jars (quart size-at least one with lid), small and large gravel, chopped (crushed) charcoal, 1 teaspoon of sifted garlic powder, large funnel, ring stand with support base.

359 x 10 15* Estimated Gallons of the Total Volume of Water in the Biosphere				
Type of Water	Salt Water	Frozen Water	Fresh Water	Vapor Water
Location	Oceans & Seas	Polar ice caps and glaciers	Ground water, rivers, streams, springs, lakes	Water in atmosphere
Percentage	97 % of the total volume of water	2.5 % of the total volume of water	0.75 % of the total volume of water	0.001 % of total volume of water

* $359 \times 10^{15} = 1,000,000,000,000,000$.

Method:

1. Read all the procedures before you start. Then predict what could happen with your results when you have successfully completed the experiment. Use Table I-1 for your answers.
2. Fill a quart jar 3/4 full of water. Then add the 1/2 cup of dirt and a small amount of the dried grass and pieces of dried leaves. Cover the jar and carefully shake.
3. Add several drops of red food coloring and 1 teaspoon of sifted garlic powder into the jar. Cover the jar and carefully shake. Using Table I-2, record the initial water volume as well as the color, clarity and odor of the muddy water.
4. Make an apparatus by setting up the funnel in the ring stand. Place a wad of wet cotton at the bottom of the funnel. Then slowly add the sand until the layer is about 4 cm high. Add a 4cm layer of crushed charcoal, a 4cm layer of small gravel and a 4cm layer of large gravel.
5. Place the beaker directly under the funnel. Then slowly pour the muddy mixture (of water, dirt, and dried leaves) into the funnel.

6. When the mixture flows through the funnel, and the filtration appears to be complete, record the time, measure the volume of purified water, and record the volume, time, and properties of filtered water in Tables I-2 and I-3. Include in your recording data the time you start the purification process, the time of the first drop of purified water dripped down into the beaker and the time the last drop of purified water dripped down into the beaker. Collected and keep the filtered water for further experiments.

Questions:

1. What is the initial volume of the water used in the experiment?
2. Can you see through the muddy mixture of water, dirt and dried leaves?
3. How well did the light penetrated through the muddy mixture of water, dirt and dried leaves?
4. What color is the muddy water?
5. Does the muddy water have odor? If yes, what kind?
6. What is the volume of filtered water?
7. Calculate the percentage of the water recovered and water lost using the following formula:

$$\frac{\text{Water Recovered (ml)}}{\text{Initial Water Volume (ml)}} \times 100 = \%\text{ of Water Recovery}$$

8. What is the percentage of the water lost in the purification process?
9. What color is the filtered water?
10. Can you see through the filtered water?
11. How well can light penetrated through the filtered water?
12. Does the filtered water have anything floating in it or on the top of it?
13. Does the filtered water have odor? If yes, what kind?
14. How long did it take for the first drop of purified water to drop in the beaker.
15. How long did it take to complete the water purification?
16. How does your prediction agree or disagree with what actually happened?
17. How many mixed components were in the muddy water and in the filtered water?
18. What kind of conclusion can you make regarding the efficiency of the purification system you used in this lab investigation? Explain. (Can you use of the following equation in helping you answering this question?)

$$\frac{\text{No. of Mixed Components in Filtered Water}}{\text{No. of Mixed Components in the Muddy Water}} \times 100 =$$

19. Based on your findings, can you infer what would happen if you use vinegar instead of garlic powder? Salt instead of food coloring? Explain?
20. Based on your findings, can you infer what would happen if you used white chalk instead of charcoal? Explain.
21. As a homework assignment, design and conduct experiments to verify your inferences in questions 19 and 20.

TableI-1: Predicting What Could Happen vs. What Actually Happened

Predicting of What Could Happen	What Actually Happened

Table I-2: Student's Data and Observations

	Before Purification	After Purification
Color		
Clarity		
Light Penetration		
Odor		
Solids Present		
Water Volume (ml)		
Water Components		

Table I-3: Student's Data and Observations

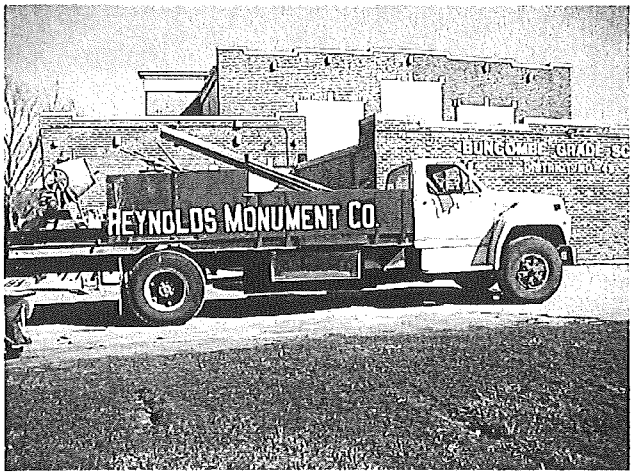
Starting Time of Water Purification	First Drop of Purified Water Dripped in Beaker	Last Drop of Purified Water Dripped into the Beaker
0 minutes		

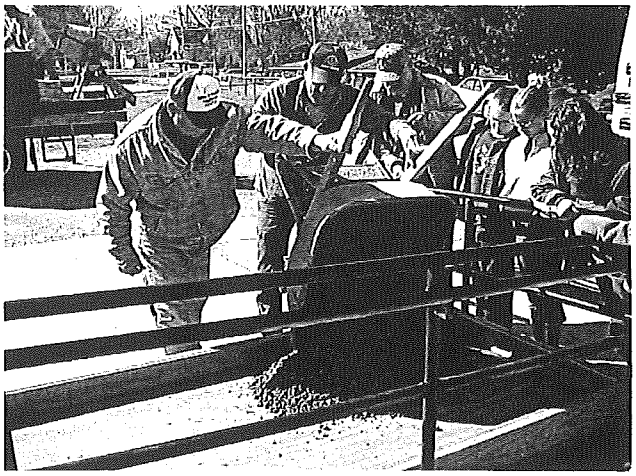
Students Build Science Project Monument

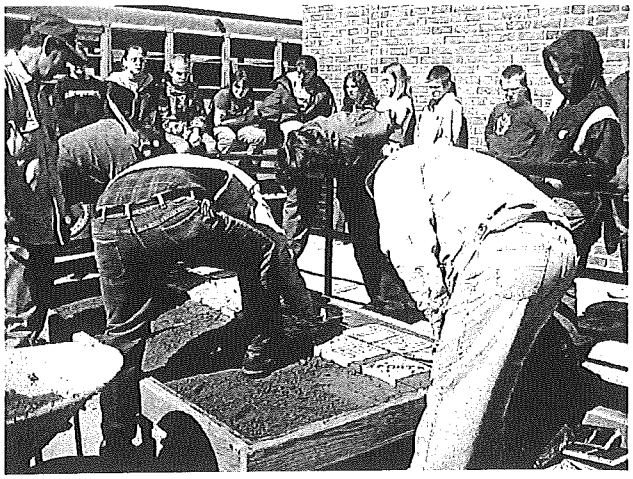
Vicki Tripp

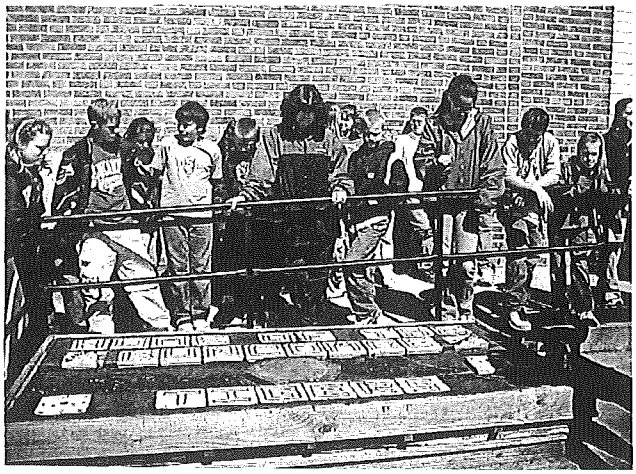
Buncombe Grade School

The 5th, 6th, 7th, & 8th grade students at Buncombe Grade School used the warm temperatures this spring to finish a project they have been working on in their Science Class. Students began this unit by studying about building bridges when they came up with the idea of making a monument for their school to set outside the school building. To implement this idea, students researched engineering occupations then used science, math, and graphing skills to complete a paper model of the project in the classroom. Next they put their ideas into stone. Each student mixed the stepping stone mixture, poured their square, and transferred the design of their block onto the concrete block. After the blocks hardened, the monument was completed with the help of J W Reynolds Monument Company of Vienna and two of their employees. This project was funded by an Education to Careers Grant. Contact Vicki at <vtripp@bgs.johnsn.k12.il.us> for more details on how to accomplish this at your school!

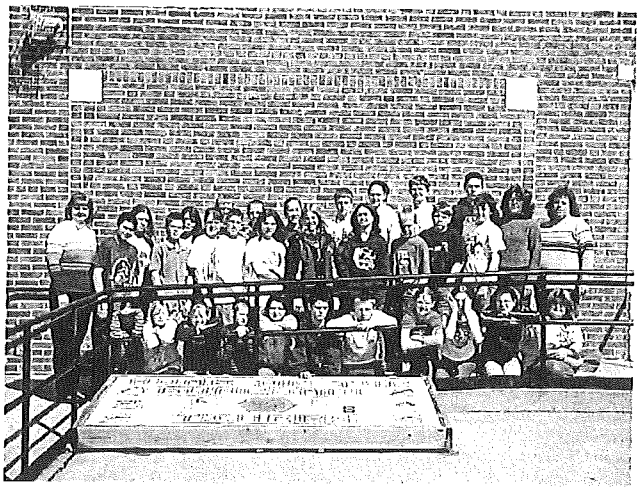


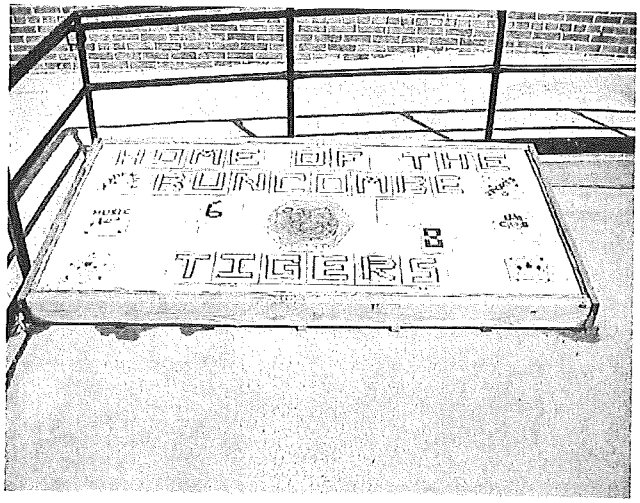






FINAL PRODUCT!





From Left to Right:
Seated: Megan Gould, Saraya Gould, Taylor Hoffmann, Daniel Webb, Sarah Dixon, Corey Smithson, Tyler Stevens, Samantha Daum, Candace Shipley, Megan Pope, & Cierra Russell.

Row 2: Mrs. Anderson, Administrator, Dustin Avery, Randy Pope, Brittany Rice, Dylan Kramp, Dana Stewart, Tori Kerley, Amy Shuit, Bobby Hoffmann, Preston Sowers, Billy Lamszus, Ms. Tripp, Science Teacher, & Mrs. Harner, 7th/ 8th Teacher.

Row 3: Shae Taylor, Koren Holder, Joe Kerley, Alex Shelton, Casey White, Dustin Goddard, Sarah Shipley, Nigel Daum, & Derek Trovillion.

The Jr-High classes of Buncombe School would like to express A SPECIAL THANKS to: Mr. Lloyd Holder, Grandparent, who built the form for the project; Mrs. Rhonda Webb, J.W. Reynolds Monument Co. of Vienna, who was generous enough to bring their equipment and crew to the school to put it all together; and adn Illinois Education to Careers Grant

From Our Affiliates

Report on the NSTA National Congress on Science Education

July 7 - 11 Bozeman MT.

Melody Orban

NSTA District XII Representative

On Wednesday, the orientation session for "first timers" gave a chance to network and meet other chapter and group affiliates. The Plenary Session focused on Defining a Highly Qualified Science Teacher and the speaker was Joanne Vasquez a member of the National Science Board.

The next full day was spent in general Science Congress Sessions where they reviewed the Motion Matrix, Credentials for Voting, Operating Policies, Agenda Adoption, and Acknowledgement of Resolutions from Associations and Affiliated Groups. Almost a full day was spent in the meeting of Focus Groups. There were six main focus groups at this year's Congress. The theme centered around NCLB and The Highly Qualified Teacher as it pertains to: Professional Development; Science Content; Pedagogical Content Knowledge; Recruiting, Retaining, and Recognizing; Assessment and Accountaility; and Equity, ESL, and Diversity Issues.

The task of the focus group was to conduct rich discussions, possibly draft resolutions, and write summaries on their topic area. The groups were asked to pose possible research topic questions involving the instruction and assessment of science. The next two days were spent in Science Congress and attending Congress Workshop Sessions

It wasn't all work and no play. There was a dinner and poster presentation hosted by the Montana State University. This included a presentaion from Dr. John Priscu a Montana State University ecologist and polar biologist of international renown. He has traveled to Antarctica for two decades and pioneered the field of life in the ice.

NABT Names Illinois OBTA

The National Association of Biology Teachers named Dr. Marie J. Urbanski the 2003-2004 Illinois Outstanding Biology Teacher Award Winner

The National Association of Biology Teachers, in conjunction with Prentice Hall and Leica, Inc. is pleased to present Dr. Marie Urbanski with the 2003 /2004 Outstanding Biology Teacher Award. This honor, given annually since 1961, identifies a teacher from each of the United States, its possessions, Puerto Rico, the District of Columbia, and Canada who has made valuable contributions to the profession and to his or her students. Criteria for the award include teaching ability, experience, inventiveness, initiative, inherent teaching strengths, and cooperativeness in the school and community. Dr. Urbanski, who teaches Biology and health at Oak Park/River Forest High School will be recognized by NABT at a special Honors Luncheon this October during its National Convention in Chicago. Registration for this year's NABT Convention is on pages 47-48.

Join fellow ISTA members at Indianapolis for the 2004 NSTA Midwestern Area Convention

November 4 - 6, 2004

Meeting Location and Times

The convention headquarters hotel is the Indianapolis Marriott Downtown. Convention registration, the exhibits, the NSTA Science Store, and the NSTA Showcase will be located in the Indiana Convention Center. Convention sessions and events will be held at the Convention Center, as well as at the Marriott and the Westin Indianapolis. The convention will begin with concurrent sessions on Thursday, November 4, at 8:00 am. The Exhibits Preview will be held from 11:00 am–12:30 pm that day. The convention will end on Saturday, November 6, at 1:00 pm with the closing of the exhibits.

Registration Deadlines

The earlybird deadline for the Indianapolis convention is **September 17**. The advance deadline is **October 1**.

The Indianapolis Convention Program

One-hour concurrent sessions are the backbone of NSTA conventions. They consist of presentations, hands-on workshops, and exhibitor workshops. Invited presentations — General Sessions and other featured presentations — are also scheduled. All sessions are open to registrants at no cost. Short courses are ticketed events that examine topics in greater depth than concurrent sessions and may be four or more hours in length. The Exhibit Hall, field trips, and social events are additional attractions.

Convention Strands

Assessment and Evaluation emphasizes the broad issue of assessment and evaluation, particularly that of K–12 students and preservice and full-time teachers. Incorporated in this strand are concepts presented in the National Science Education Standards and the AERA/NCME/APA Standards for Educational and Psychological Testing. Key ideas in this strand are issues of teacher-created assessments, influence of state and national standards on student assessment, K–12 statewide testing, current and potential impact of "No Child Left Behind."

Technology focuses on application and integration of technology in the science classroom; the ideas presented in the National Science Education Standards on science and technology; and the what, why, and how of learning as related to the effective use of technology as a tool for science teachers.

Literacy focuses on the aspects of scientific literacy as set forth in the National Science Education Standards—greater knowledge and understanding of science subject matter and understanding of the nature of science, the scientific enterprise, and the role of science in society and personal life.

Science Outside the Box is concerned with science teaching and learning that occurs outside the traditional institutions of science education. Forums for outside-the-box science teaching and learning are informal science settings, such as art museums and service learning opportunities that include environmental quality assessment reports for recreation parks. Teaching and learning at the college or university level, within child-care centers, and in inclusive community organizations are also examples of outside-the-box venues.

Join us at the ISTA booth to publicize the 2005 Regional in Chicago. We are planning an informal ISTA get -together!
For more information on the Indianapolis Convention go to:
http://www.nsta.orgconventiondetail&Meeting_Code=2004IND

Your Invitation to NABT Convention 2004
November 10-13-2004
Chicago, Illinois

The National Association of Biology Teachers invites you to attend its 2004 Convention in Chicago, November 10-13. Why should you attend an NABT Convention?
As **The Leader in Life Science Education**, our members reach more than a million students! But that's not the only reason.

Go to network! You can network while standing in line, sharing a meal, or eavesdropping on conversations around you. Networking simply means sharing ideas and information with others. You can get some great classroom ideas from networking but even more important, you can get sources to contact.

Go for the sessions! These include symposiums, demonstrations, hands-on workshops, and papers. You can learn some new techniques for the classroom and lab and hear the latest developments from experts in their disciplines. NABT Conventions have included such speakers as James Watson, E.O. Wilson, Stephen J. Gould, Niles Eldridge, Francis Collins, and Thomas Lovejoy.

Go for the exhibits! They're full of the latest in classroom technology as well as lots of resources to take home. In addition, the vendors often sponsor daily door prize drawings. Exhibitors are usually eager to talk, not only about their products, but also about ideas and methods to use in your classroom.

Go to present! Take advantage of the opportunity to deliver a conference presentation. It allows you to share information with other participants interested in your subject. They may even have suggestions or ideas for you. The presentation builds leadership skills, which may lead to presentations at other conferences.

Go for the field trips! Field trips are a fun part of any convention. Not only do they provide a break from the sessions; they provide interesting local phenomena as well as experiences to take back to your students.

Go to learn about opportunities! You never know whom you'll meet or what you'll learn at conventions. Frequently organizations offer grants for various projects. Some of these might be excellent for your classroom. Pick up an application and see what happens.

Go to meet new friends and old! As you begin to attend conventions, you'll see friends and colleagues from previous conferences. You'll meet them for dinner, go on field trips with them, and develop lasting friendships. At the same time, you'll meet new friends who may be attending their first convention.

Go to experience Chicago! We are especially proud to be holding this year's convention in Chicago, a vibrant city known for its excellent museums and fine restaurants. The Museum of Science and Industry, The Shedd Aquarium, Buckingham Fountain and the Chicago Botanic Gardens are renowned. Chicago is the birthplace of the steel framed skyscraper, the Ferris Wheel, Butterfinger and Baby Ruth candy bars and as well as our own NABT. The "Windy City," named not for its weather but for its long-winded politicians, has a celebrated multicultural heritage, reflected in its neighborhoods, ethnic cuisines and citizens from all over the world.

Attention all ISTA Members: *As a special coutesy to ISTA members, NABT will offer the NABT member registration rate to ISTA members. Simply use the ISTA registration form found in this newsletter.*

2004 NABT Convention Registration Form

Wednesday, November 10 – Saturday, November 13 ◆ Hyatt Regency Chicago, Chicago, Illinois

A separate form must be completed by each person attending the Convention, including spouses. Please photocopy this form for additional registrants. Registration forms for each person must accompany a purchase order. Please print legibly using a ball point pen. Items marked with (*) will appear on your Convention badge.

SECTION I

PERSONAL INFORMATION (All Convention information will be sent to the address below.)

Name* _____
First Last

School/Organization* _____

Mailing Address _____
This is my ☐ home ☐ work address City State/Province Country Zip

Work City/State/Province* _____

Work Phone ( )_____ Home Phone ( )_____ Fax ( )_____ E-Mail _____

Please mark all that apply:

Position: ☐ teacher/prof ☐ dept head/chair ☐ administrator ☐ supv/coordinator ☐ student ☐ other

Level: ☐ elementary ☐ jr high/mid sch ☐ senior high ☐ two-year college ☐ four-yr col/univ ☐ other

Courses taught: ☐ bio/life sci ☐ AP bio ☐ gen sci ☐ chem ☐ env sci ☐ sci ed ☐ other

Years teaching: ☐ 1-3 ☐ 4-7 ☐ 8-12 ☐ 13-17 ☐ 18-20 ☐ 21+

This is my first NABT Convention: ☐Yes ☐ No

☐ I require special assistance during the meeting in order to fully participate. I will need: _____
(Attach an additional sheet if necessary.)

SECTION II

CONVENTION REGISTRATION FEES

For Advance registration savings, your registration must be postmarked by the date shown. Registration is required for admission to all sessions and exhibits.

Full Registration	**Special ISTA Rate by 10/8**	**On-Site Rate**
☐ Full/Spouse Member Member ID # (on mailing label)	$125	$190
☐ Nonmember	$170	$235
☐ **Nonmember Opportunity (Register & Join NABT)**	**$190**	**$240**
☐ Retired Member	$80	$125
☐ Fulltime Student	$75	$120
☐ Nonteaching Spouse/Family/Guest	$55	$95
Daily Registration		
☐ Wednesday (no exhibits)	$80	$125
☐ Thursday	$90	$135
☐ Friday	$90	$135
☐ Saturday	$80	$125

CONVENTION REGISTRATION TOTAL: $ _____

MEMBERSHIP RENEWAL PER YEAR
Comprehensive Member $90; Full Member $65;
Student/Retired Member $32; Spouse Member $27

MEMBERSHIP RENEWAL TOTAL: $ _____

TOTAL AMOUNT ENCLOSED: $ _____

SECTION III

PAYMENT METHOD

NABT accepts checks drawn on U.S banks and international money orders (payable to NABT), MasterCard or VISA, and Purchase Orders.

☐ Check ☐ MasterCard ☐ VISA ☐ P.O. *(please attach)*

If you are using a credit card, complete this section:

_____
Name (as it appears on the card. Please print)

_____
Credit Card #

_____
Exp. Date Signature

Important: **Total amount or purchase order must be received before this form can be processed.** After **October 8**, you will have to register on-site at regular Convention prices.

**If registering by purchase order, please notify your business office of deadlines and rates.*

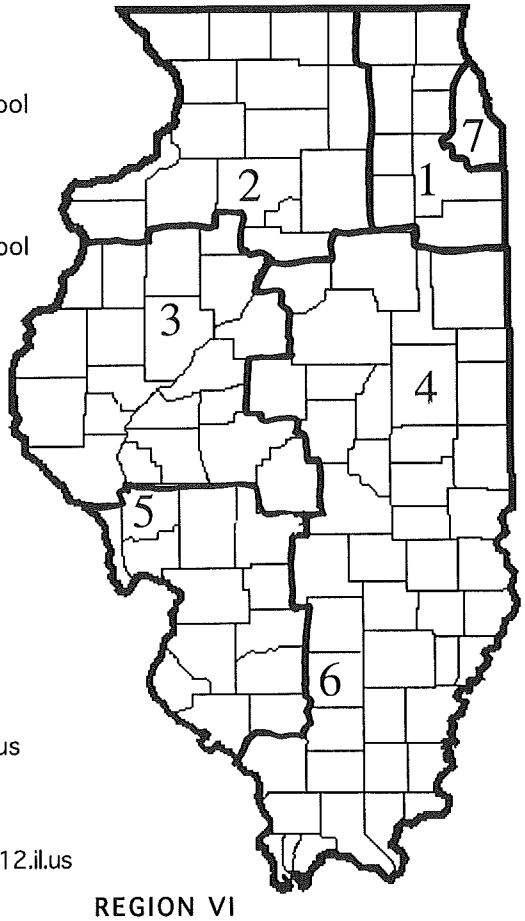
Registration forms postmarked after October 8 will be returned. If you must cancel for any reason, please notify NABT in writing by **October 8.** A $10 handling fee will be assessed for **all** refunds. No refunds will be made after **October 8. Registration fees for program participants are not refundable at any time.**

FOR OFFICE USE ONLY ISTA
☐Check _____ ☐Charge _____
☐School Check # _____ ☐P.O.# _____
Amount Received: $ _____ Date: _____

TWO EASY WAYS TO REGISTER!
By Fax: 703/264-7778 (available 24 hours a day)
Credit card and purchase orders only!
By Mail: NABT, PO Box 791048, Baltimore, MD 21279-1048

IF YOU REQUIRE ASSISTANCE ... to complete this form, or if you have questions, call the National Association of Biology Teachers at (703) 264-9696 or toll-free at (800) 406-0775. E-mail us at office@nabt.org.

ISTA REGIONAL DIRECTORS



REGION II
Larry McPheron
Boylan Catholic High School
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lamcp@hotmail.com

Donald Terasaki
Boylan Catholic High School
Rockford
dsaki@hotmail.com

REGION III
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jcarter@pekinhigh.net

Randal Musch
Jacksonville High School
pvnrt@fgi.net

REGION V
Pam Abbott
RCUSD #1
Roxana
pabbott@madison.k12.il.us

Liza Basden
Highland High School
lbasden@highlandmadison.k12.il.us

REGION VI
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Fairfield Community High School
wheyduck@fchs.wayne.k12.il.us

Jacqueline Meadows
Egyptian Elementary School
Tamms
wbdoodle@yahoo.com

REGION VII
Renee Bearak
Ames School
Chicago
rbearak@comcast.net

David Krumwiede
Sumner
krumfun@aol.ocm

REGION I
Tom Kearney
Andrew High School
Tinley Park
TKearney@d230.org

Anna L. Zuccarini
Crone Middle School
Naperville
anna_zuccarini@ipsd.org

REGION IV
Kendra Carroll
Shiloh Schools
Hume
carrollk@shiloh.k12.il.us

Susan Golden
Dist. 161
Decatur
sgolden@dps61.org

ISTA Membership Categories

Option 1: Full Membership Dues- $35.00 Full Membership entitles individuals to the following benefits: a one year subscription to the SPECTRUM and ISTA ACTION; inclusion in the members-only ISTA-TALK listserv; notification of regional conferences and meetings; voting privileges; and the opportunity to hold an ISTA Officer position.

Option 2: Two-Year Full Membership Dues- $60.00 — Two-Year Full Membership entitles member to Full Membership benefits for two years.

Option 3: Five Year Full Membership Dues- $125.00 — Five Year Full Membership entitles member to Full Membership benefits for five years.

Option 4: Associate Membership Dues- $15.00 — For full-time students and to individuals who are on retirement status. Entitles member to Full Membership benefits, with the exception of the opportunity to run for office.

Option 5: Institutional Membership - $75.00 — Institutional Membership entitles the member institution, for a period of one year, to two subscriptions to the SPECTRUM and ISTA ACTION; notification of regional conferences and meetings; and a reduced registration fee for the Annual ISTA Conference for a maximum of three members of the institution.

ILLINOIS SCIENCE TEACHERS ASSOCIATION

2005 MEMBERSHIP APPLICATION

PLEASE PRINT OR TYPE AND FILL OUT COMPLETE FORM

Name	Day phone
Affiliation (School or Organization)	Home phone
Address of above organization	Home address
City, State, Zip Code	City, State, Zip Code
e-mail and/or FAX	County in Illinois

CHECK APPLICABLE CATEGORIES IN EACH COLUMN

o Elementary Level	o Elementary Sciences	o Teacher
o Middle Level	o Life Science/Biology	o Administrator
o Senior High School	o Physical Sciences	o Coordinator
o Community College	o Environmental Science	o Librarian
o College/University	o Earth Science/Geology	o Student
o Industry/Business/ Government	o Chemistry	o Retired
	o Physics	
o Other_____	o General Science	
	o Integrated Science	
	o Other_____	

Send form and check or money order made payable to Illinois Science Teachers Association to: Diana Dummitt, ISTA Membership, College of Education, University of Illinois, 1310 S. Sixth Street, Champaign, IL 61820

MEMBERSHIP OPTION (See inside back cover)_____

AMOUNT ENCLOSED_____

ISTA SPECTRUM
UNIVERSITY OF ILLINOIS
COLLEGE OF EDUCATION
1310 S. SIXTH STREET
CHAMPAIGN, IL 61820

NON-PROFIT ORGANIZATION
U.S. POSTAGE PAID
CHAMPAIGN, IL 61820
PERMIT #75

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Dues to 2010
Gary L. Butler
420 S Tower Rd
Dawson IL 62520-3392

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