SPECTRUM

Fall 2007, Vol. 33, No. 2

ista

The Journal of the Illinois Science Teachers Association

In this Issue:

Plan Ahead:

ISTA Conference - November 8-10, 2007

Spectrum

The Journal of the Illinois Science Teachers Association
Volume 33, Number 2

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Send submissions and inquiries to the editor. Articles should be directed to individual area focus editors (see next page and *write for the SPECTRUM information).*

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On the cover: Nancy Clarke on MultiAxis Chair. See article on pages 33-34, *Space Academy for Educators.*

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SPECTRUM

The Journal of the Illinois Science Teachers Association

Fall 2007 Volume 33, Number 2

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President's Corner

Jill Carter

Pekin Community High School

I hope everyone is back "in the swing of things" this school year. One of the difficulties we face in our profession is isolation. We deal with students all day and have little chance to collaborate or network with colleagues. Sometimes we need to brag about our successes in the classroom and sometimes we might just need to vent. Other times we are looking for feedback or new ideas. ISTA has just the solution to your isolation. Come to our fall conference in Peoria! Our theme this year is "Science Education: Providing a Pathway for Inspiration and Imagination." When is this fabulous event? Friday and Saturday, November 9 and 10, 2007. It will be held at the Peoria Civic Center and the Hotel Pere Marquette. We have a variety of sessions presented by teachers of science from all grade levels and all science areas. These presenters are coming from all over the state as well as a few "out-of-staters" and some sessions that are done by our fabulous vendors. And speaking of vendors, you won't want to miss the Exhibit Hall. Pick up new ideas, learn about new products, and reacquaint yourself with the "tried and true" equipment and supplies. The Exhibit Hall opens Thursday night. Please join us for this event also!

We have a great social planned for Friday night. Back by popular demand will be the Gala at Lakeview Museum in Peoria. Come and sample a variety of foods and drinks. Wander through the museum gallery. Shop in the museum store. Experience a laser light show in the planetarium. Visit with familiar friends, make new friends. Dance the night away with a live band!

We also have a pre-conference planned for Thursday. Those that attend will learn about the new expectations for our students in the sciences. Strategies will be discussed.

Where can you find a registration form? Just go to our website at http://www.ista-il.org/. You'll find a registration form, hotel information, and more. Please plan on coming this year – get rejuvenated and end your isolation!

2007-09 ISTA Executive Committee

Vice President
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Riverdale High School
aa2100@riverdale.rockis.k12.il.us

Secretary
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carrollk@shiloh.k12.il.us

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gpollock@isbe.net

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Carl Koch
aecKoch@aol.com

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Raymond Dagenais
Illinois Mathematics
and Science Academy
rjdag@imsa.edu

ISTA Discussion List Changes

Fellow ISTA members,

As you may have noticed from the "To" line, the address of the ISTA discussion list has changed. From here on out, please use the address talk@ista-il.org for discussions, rather than the old address, istatalk-l@listserv.uiuc.edu. The old address will remain active for a few more weeks, but will then be retired.
If you have any questions, please contact Neal at ngroot@imsa.edu.

2007-09 ISTA Committee Chairs

Archives	Maurice Kellogg
Awards	Sher Rockway
Convention	Executive Director
Convention Program	Donna Engel
Finance	Vice President - Andrew Apicella
Membership	Donna Engel
Nominations and Elections	Past President – Ray Dagenais
Public Relations	Tom Kearney
Professional Development/Building a Presence	Mary Lou Lipscomb
Publications Committee	Judith A. Scheppler

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Lederman Science Center
sdahl@fnal.gov

Region 1 Director 07-09
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Nicol.Christianson@bps101.net

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Region 2 Director 07-09
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Region 4 Director 06-08
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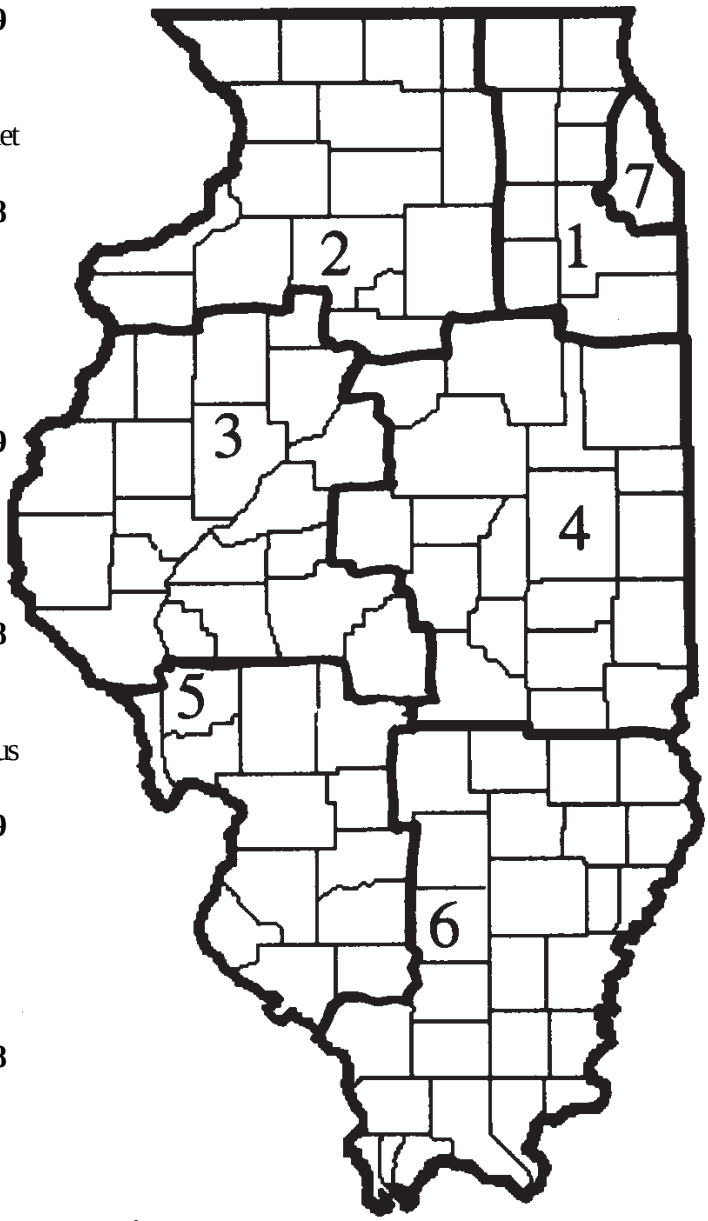
l.shadwick@mchsi.com



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tsimpson@watseka-u9.k12.il.us

Region 5 Director 06-08
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Region 5 Director 07-09
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Region 7 Director 06-08
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Region 7 Director 07-09
Denise Edelson
Hannah G. Solomon School
dnedelson@cps.k12.il.us

http://www.ista-il.org/

Illinois Science Teachers Association

2008 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
_____	_____
Email and/or Fax	County in Illinois/ ISTA Region (see map)

CHECK APPLICABLE CATEGORIES IN EACH COLUMN

O Elementary Level
O Middle Level
O Secondary Level
O Community College
O College/University
O Industry/Business/ Government
O Other_____

O Elementary Sciences
O Life Science/Biology
O Physical Sciences
O Environmental Science
O Earth Science/Geology
O Chemistry
O Physics
O General Science
O Integrated Science
O Other_____

O Teacher
O Administrator
O Coordinator
O Librarian
O Student
O Retired

Send form and check or money order, made payable to Illinois Science Teachers Association, to: Sherry Duncan (email: sjduncan@insightbb.com), ISTA Membership, PO Box 295, Urbana, IL 61801.

MEMBERSHIP OPTION (see below)_____ AMOUNT ENCLOSED _____

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*; 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 member benefits for five years.

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

Opiton 5: Institutional membership - $75.00. Institutional membership entitles the member institution, for a period of one year, to two subscriptions to the *Spectrum*; 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.

ISTA / ExxonMobil Outstanding Teacher of Science Awards Program

The Illinois Science Teachers Association with the generous support of ExxonMobil announces the 2007 - 2008 ISTA / ExxonMobil Outstanding Teacher of Science Awards Program. Applications will be accepted from K – 8 teachers of science who have demonstrated "extraordinary accomplishment" in the field of science teaching. These accomplishments are intended to be something that goes beyond the classroom and enriches the lives of students. Examples include personal or community-wide achievement which is science related (grants for the school, working on environmental projects, and so forth). It could be working with other teachers or community members to develop a product or process related to science education. It could also be the creation of a science group at the school which enriches and extends beyond the school day.

The 2007 – 2008 program consists of seven one thousand dollar prizes. One $1000 award will be presented to one K – 8 teacher of science from each of the seven ISTA regions in the state of Illinois.

The awards are intended to recognize "extraordinary accomplishment" in the field of science teaching. Applicants must provide evidence that demonstrates accomplishments that go beyond normal classroom teaching.

Criteria for consideration include:

1. Current ISTA membership
2. Full time teaching assignment
3. Teaching assignment in the ISTA Region for which application is submitted
4. Written narrative (maximum of 500 words) describing the teacher's "extraordinary accomplishments" in the field of science teaching
5. Evidence that supports the teacher's description of "extraordinary accomplishments" in the field of science teaching
6. Two letters of support from individuals who can attest to the impact of the "extraordinary accomplishments" in the field of science teaching
7. A completed application form with required supplementary materials submitted by March 1, 2008 to:

Dr. Sher Rockway
ISTA Awards Chair
34136 N. Lavender Circle
Grayslake, IL 60030

Winners will be notified by April 15, 2008.
For more information contact Dr. Rockway at sher_rockway@comcast.net.

2007-2008 ISTA/ExxonMobil Outstanding Teacher of Science
Awards Application Form
Application Due Date March 1, 2008

ISTA Region:_____

Name:_____

Position (grade and subject taught):_____

School Name/Address:_____

_____

School Phone Number:_____

Email address:_____

Home Address:_____

_____

Home Phone Number:_____

I hold 2008 calendar year membership in ISTA: _____

I certify that the information provided in this award application is true and accurate.

Signed:_____ Date: _____
(Applicant)

2006-2007 ISTA/ExxonMobil Outstanding Teacher of Science Award Winners

Region 1 - Eeva Burns

Eeva teaches eighth grade science at Big Hollow Middle School in Ingleside. Eeva has been teaching for ten years and has been at Big Hollow since 2001. She writes "One thing that I have learned in those years is that students will rise to the level of your expectations. They will do and learn the most astounding things if you give them the opportunity and the tools to do so." To give students those tools, Eeva has been successful in grant writing, receiving about $10,000 of equipment from eight grant sources. Some of the equipment from the grants, such as the CBL2's, GPS, and digital cameras, are used by her students at nearby Volo Bog where Eeva has worked with the naturalist to develop a plant research project. She also works collaboratively with other teachers in her grade level in designing a forensic unit and a genetics unit. She has been a participant in the Illinois Rivers Project, ENTICE program, and NASA Educational Workshop 2002 (NEW). Eeva is an integral part of the school improvement team, building PTO, and district Referendum Committee. She also serves as a key leader for Illinois Building a Presence for Science.

Region 2 - Kent Buckrop

Kent teaches seventh grade Earth science and social studies at Glenview Middle School in East Moline. Kent has been teaching since 1989 and has been at Glenview Middle School since 1990. "He consistently displays a unique ability to try an activity in another way; he chooses to approach and solve problems from various angles not inherent within the activity. I can infer that he encourages his students to do the same," is stated in one of his letters of recommendation. Two Liter Meteorology, a presentation given at a Pre K-8 Update Conference at Western Illinois University is one example. In the after-school program, IMSA Excellence 2000+ (E2K+), he introduced a number of additional rocketry activities to the "Let's Do Launch – Learning about Force and Motion" unit. Kent is also interested in "down to earth" activities and has written grants to create an outdoor learning environment. It started with receiving a grant for picnic tables for an outside area where students could learn about ecology, botany, and be taught in an outside environment. He later received grants for landscaping, seed starting supplies, and a greenhouse. Kent serves as a point of contact for Illinois Building a Presence for Science.

Region 3 - David E. Brown

David teaches fifth grade at Baldwin Intermediate School – West in Quincy. David began his teaching career in Florida in 1988 and has been in his present school for two years. His principal writes, "Walking into Mr. Brown's classroom is like walking into a living nature museum. Students in his class take an active part in developing and maintaining specific areas in the nature section of his classroom. Not only does Mr. Brown utilize this nature area in conjunction with science curriculum, but also with writing instruction." David has received numerous grants, one of which recently provided support for a field trip to Fall Creek Preservation Area and Siloam Springs State Park where students biomonitor and share their results with the Illinois Department of Natural Resources. David has been the recipient of many awards, the most recent being Outstanding National Conservation Educator 2007 by the Paul F. Brandwein Institute.

In 2003 he was selected for the Teachers Experiencing the Arctic and Antarctica Project Fellowship where he spent two months in the Arctic with a research team from the University of Tennessee on the Arctic Environmental Observatory Project. He currently serves on the Quincy Public School District Science Committee and is the Founder of the Baldwin Green Team/Teacher Environmental Education Team.

Region 4 - Troy J. Simpson

Troy teaches seventh grade life science and eighth grade Earth science at Glenn Raymond School in Watseka. Troy began his science classroom teaching in 2002. Prior to that, he has been a technical assistant at the Illinois State Geological Survey, a business/education liaison, and an LD resource instructor. Troy's classroom motto is a quote from Roy Chapman Andrews: "Always there is an adventure just around the corner, and the world is still full of corners." Troy's adventures in the classroom and school involved receiving grant monies in excess of $10,000 which paid for projection and interactive whiteboard system, computer and calculator integrated lab probes, and GIS technology. The technology is used by students and Troy assists his fellow faculty in learning how to use the equipment effectively in their classrooms. Beyond the day, Troy the school day, Troy coaches an extremely successful Science Olympiad team and is the co-sponsor of the Science and Outdoor Education Club. This club reaches the entire school population with activities that have ranged from canoeing to geo-caching and even caving. Troy was recently elected to ISTA Region 4 director 2007-2009.

Region 5 - No entries

Region 6 - Jeff Bremer

Jeff teaches seventh and eighth grade science at Vienna Grade School in Vienna. He has been teaching there for the last nineteen years and taught for two previous years in a nearby district. Jeff's principal states, "His "hands-on" approach to teaching/learning has certainly enhanced student learning while providing students with a true sense of how science affects their world and the work around them." As evidence, "96.8 % of his student met/exceeded state standards on the 2006 ISTA" in a school that is categorized as economically disadvantaged. Jeff writes, "In twenty-one years of teaching, I have tried to make use of opportunities to teach outside the textbook." His students have had projects in a science fair for the past eighteen years. His students participated in the Invent America resulting in one project being a state award winner. His classes have participated in the county-wide testing project, canoe trips where macro-invertebrates were studied, leaf studies led by the U.S. Fish and Wildlife Service at Heron Pond in the Shawnee National Forest, and diversity studies in the Ferne Clyffe State Park, At the DuQuoin Construction Exposition students have exposure to carpentry, metalwork, concrete, and electrical work opportunities. Jeff has been trained as a Starlab presenter and does presentations for every grade level. Jeff operates a family farm and coaches the basketball team.

Region 7 - Wendy M. Jackson, Ph.D.

Wendy teaches seventh and eighth grade science at Yates School in Chicago. She has taught there since 2003. Wendy has an extensive background in ecology dating from 1982. As stated in one of her letters of recommendation, "Her interest is in bringing the excitement of scientific investigation to her students and in helping them to imagine themselves as future scientists." In 2003, she received her first grant for "Water, A World of Wonder" (focusing on the physical and chemical properties of water) which was followed in 2004 by a National Geographic Society Teacher Grant of $5000 for "Water, A World of Wonder" (focusing on the biological, ecological, and cultural significance of water). She is developing an urban ecology curriculum using simple feeding experiments with tree squirrels and a web-based citizen science project to test hypotheses about ecology and animal behavior. She received other grant monies for materials and supplies to create an after-school club for "Quilting: Where4 Science and Art Meet." She is a Science Team Leader for the Chicago High School Redesign Initiative, a Professional Development Leader for the Chicago Math and Science Initiative, and a mentor for pre-service science teachers enrolled in courses at the University of Illinois at Chicago. She has several publications and she was recently on the panel "Teaching in "High Need' Schools" at the NSF conference on Recruiting Science and Mathematics Teachers for the 21st Century held in Washington, D.C.

Award from Region 5-given to highest point holder from all other applicants:
Region 7 - Ed Caster

Ed is a Magnet Cluster Lead Teacher, Science Resource/Teacher, and Coordinator of E2K+ at Dunne Math, Science and Technology Academy in Chicago. Ed has been a teacher in the Chicago Public Schools for thirty-four years. He has been chairperson of the social studies committee at Hope Middle School before becoming a self-contained classroom teacher at Dunne. He has been a math teacher and then a computer lab instructor. As his current principal attests, "It does not matter what subject he teaches, he excels in instruction." Ed is a teacher on the Homework Show in which he is able to show how science and reading can be integrated, does experiments and demonstrates how much fun science can be. He has organized the school science fair and worked with Area Science Fair as well. He was instrumental in developing a partnership with the Shedd Aquarium through its Navigators program. This program allows the teachers the grades K – 5 to borrow science units from the Shedd. For IMSA, he has been the site coordinator for their Early Involvement Program. This program is focused on helping ninth grade students to improve their math and science skills and on prepaying them to take the SAT as part of the application requirements for IMSA. Ed has also taught in the SEAMS program (Summer Enrichment for Academics in Mathematics and Science) which is designed to offer an opportunity to eighth grade graduates who are from groups that are underrepresented and often underserved in math and science.

Illinois Science Teachers Association
2007 Conference on Science Education
Peoria Civic Center & the Hotel Pere Marquette
November 8 – 10, 2007
Pre-Registration Form

Deadline for Early Bird Pre-Registration: Postmarked by October 6, 2007

Deadline for Advance Registration: Postmarked between October 7, 2007 and October 27, 2007

Registration on or after October 28, 2007: On-site only

Fill out form completely. Print clearly. Information will be used for our records.

Name: _____ Spouse/Guest Name (if attending) _____

Home Address _____ Home phone (_____) _____

City/State/Zip _____ County where you work _____

Affiliation/School _____

Business Address: _____ Business phone (_____) _____

City/State/Zip _____ Email _____

☐ Check here if you need special assistance due to handicap (describe on extra sheet).

☐ Check here if you would like to be a presider for a session.

☐ Check here if you have been teaching 3 years or less.

Pre-Conference Registration (Thursday only)
(Includes Exhibit Preview and Exhibit Hall Preview Reception)

☐ Registration $75 _____

Conference Registration (Friday and Saturday)
(Includes Thursday Exhibit Preview and Exhibit Hall Preview Reception)

Please circle correct amount.

Registration Fees	**Earlybird** 10/06/07	**Advance** 10/27/07	**Full Rate** After 10/27
☐ Current ISTA member	$100	$115	$125
☐ Nonmember (includes one-year membership)	$135	$150	$160
☐ Institutional members (up to 3 individuals) *	$95/person	$110/person	$120/person
☐ Full-time student	$15	$15	$15
☐ Saturday only (Exhibit Hall not open)	$65	$70	$75
☐ Non-teaching spouse/guest	$15	$15	$15

Enter Registration fee _____

Social Events (Tickets for these events will not be sold at the door)

Thursday Reception in Exhibit Hall (4:00 to 7:00 pm) No charge, but please register $00.00 _____

Friday Luncheon – Hotel Pere Marquette – All are encouraged to attend $15.00 _____

Friday Night Gala (dinner/dance) & Awards Reception at Lakeview Museum – open to anyone attending Thursday, Friday, and/or Saturday $20.00 _____

Total Due: _____

* Please send all registrations in the same envelope.

Make checks payable to: Illinois Science Teachers Association. Send to Sherry Duncan, ISTA Registration, P.O. Box 295, Urbana, IL 61801. No one will be admitted to any part of the convention without registering. If your registration form is received by October 29th you will receive a confirmation in the mail. If it is received after that date, you may pick up your information at the registration area in the Peoria Civic Center.

2007 ISTA Exhibit Hall Extravaganza

The Peoria Civic Center Exhibit Hall will be open Thursday afternoon, November 8, and all day Friday, November 9. Vendors will be displaying the most current and innovative materials, supplies, and equipment. Prizes will be available for visiting vendor booths. The hours are:

Thursday, November 8, 2007
4:00 PM - 7:00 PM Exhibit Hall Open (*Free finger food and a drink ticket*)

Friday, November 9, 2007
9:00 AM - 10:00 AM Exhibit Hall Open (*Free coffee and rolls in the morning*)
(No conference sessions will be held at this time)

10:00 AM – 5:00 PM PM Exhibit Hall Open

Please spend some time discussing your needs with the vendors and getting new ideas from them.

2007 ISTA Annual Conference Hotel Information

The 2007 ISTA conference hotel is the Hotel Pere Marquette in Peoria. The Thursday (November 8, 2007) pre-conference session will be held at the Hotel Pere Marquette along with several conference breakout sessions on Friday (November 9, 2007) and Saturday (November 10, 2007). Expect to meet friends and colleagues at one of the many social gathering spots on the premises. The Hotel Pere Marquette is a short walk to the Peoria Civic Center where exhibitors will have all the newest supplies, equipment, and science education resources on display.

The Illinois Science Teachers Association has reserved a limited block of rooms at the Hotel Pere Marquette for conference attendees. Be sure to mention that you are registered for the Illinois Science Teachers Association conference in order to reserve a room at the special conference price of: Single or Double $94.00.

Room rates are per night and are subject to taxes and applicable charges.
Parking is free for registered guests.

To reserve a room at the conference rate you must contact the Hotel Pere Marquette.
Reservations Only: 1-800-447-1676
Information: 1-309-637-6555

2007 Conference Schedule

(tentative)

Thursday, November 8

Pre-conference -ISELA: Renewed Emphasis on Science Education
4PM - 7PM Exhibit Hall Open (Free finger food and a drink ticket)

Friday, November 9

8AM Keynote Speaker - ExxonMobil - The Future of Energy
9AM -10AM Exhibit Hall opening
10:10AM - 11:00 AM Breakout Session A
11:10 AM - 12:00 PM Breakout Session B
12:10 PM - 1:00 PM Lunch - advance ticket required - see registration form
1:10 PM - 2:00 PM Breakout Session C
2:10 PM - 3:00 PM Breakout Session D
3:10 PM - 4:00 PM Breakout Session E
4:15 PM - 4:30 PM Exhibit Hall Door Prize Give Away
7:00 PM - Gala Lakeview Museum (Dinner and drinks) Cost: $10 in advance

Saturday, November 10

7:45 AM - 8:45 AM General Membership Meeting / Breakfast
9:00 AM - 9:50 AM Workshop Session 1
10:00 AM - 10:50 AM Workshop Session 2
11:00 AM - 12:00 PM Workshop Session 3
12:00 PM - 12:50 PM Workshop Session 4

Volunteers Needed!

The ISTA conference organizers can use your assistance. Help is needed especially with registration and registration-related tasks. So if you have some free time at the conference, please stop by the registration desk.

To volunteer, you can also email Colleen Martin at cmartin@dunlapcusd.net.

Lakeview Museum Gala

Friday Night at 7:00 PM

Please join us for:

Drinks
Dinner
Dancing
Door Prizes
Museum Tour
Laser Light Show

advance tickets ($10) required
please see the conference registration form

2007 ISTA Conference Vendors

Exhibit Hall Open:

Thursday 4-7PM

free finger food and a drink ticket

Friday 9-10AM

free coffee and rolls

Friday 10AM - 5PM

Prizes available for visiting the vendor booths!

AIDEX
Bio-Rad Laboratories
Carolina Biological Supply Company
CPO Science
Delta Education/FOSS
Eastern Illinois University-College of Science
Energy Concepts, Inc.
Environmental Education Association of Illinois
Explore Learning
Fermi National Accelerator Laboratory
Fisher Science Education-Fisher Scientific
Fotodyne, Inc.
Frey Scientific
Illinois Association of Aggregate Producers
Illinois Department of Natural Resources
Illinois Petroleum Resources Board
It's About Time-Herff Jones
Kendall/Hunt Publishing Company
LAB-AIDS, Inc.
Mad Science of McHenry County
McDougal Littell
Museum of Science and Industry
National Science Teachers Association
Perfection Learning
Prentice Hall
Project STAR and Rivers Project
Riverside Scientific, Inc.
Science Kit and Boreal Laboratories
Scott Foresman (Pearson) Publishing
Texas Instruments
The Scope Shoppe, Inc.
University of Illinois at Urbana-Champaign Engineering Council
Vernier Software and Technology

Providing a Pathway for Inspiration and Imagination

Sampling of Sessions

Using Technology to Enhance K-12 Science
Inspire the Next Generation of Explorers: Become a NASA Explorer School
The Ants Great Crystal Adventure
The Wolf-Moose Mix on an Island
New Materials and Programs from the IDNR
ISTA and Illinois Mayors Will Go Green
The Art of Science
Teach SMART with a Smartboard!
CSI – Chemistry Scene Investigation
Investigating Earth Systems – Have Your Students Think Like a Scientist
Learning from the "Awakening Dragon"
Grant Writing
Using Beta-Galactosidase to Study Enzyme Activity
Environmental Inquiry: Students Conducting Authentic Science Research
Why we Look the Way we do – Crazy Traits
An Alternative Project on Alternative Energy
Astronomy Activities for the Elementary Classroom
Teachers for Tanzania: Global Partnership for Education
Let Them Eat $C_7H_8N_4O_2$ (Chocolate, That is!)
Enhanced Field Trips: Engaged Learning in Museum and Classroom
The Cell And Beyond
The Myth Buster Model: Inquiry Activities with Anticipatory Set
The Great Nanotechnology Revolution
Sleuthing and Scouting for Species
1/3 Heart, 1/3 Head, and 1/3 Ham
Bio-Rad Forensic DNA Fingerprinting Kit
Alternative Lab Assessment
Read for Stars – How to Help Your Students Become the Best Readers Under the Sun
Importance of Physiology in Middle School Classrooms
Investigations in Environmental Science
Testing the Anti-Microbial Properties of Silver Nanoparticles
Improving Chemistry Literacy Using Computational Tools
Material Science Technology: Integrating Science and Technology
Factors Affecting the Career Choice of Six Women in Higher Education
NASA: The Cosmic Zoo
Teaching Science to Home Schooled Students
Newton's Laws: An Integration of Technology
Visualizing a Pond Ecosystem: What Next?
Building a 3-D Printer in Your Classroom
Paper Microarrays: A Classroom Exercise
How Copernicus Moved the World: The Shift from Geocentrism to Heliocentrism
Physics of the Cell Phone
From Methods Course to Mainstream Practice: Profiles of Graduate Student Work in Science Education
Immerse Your Students in the Great Lakes – Bring Back a Boatload of Engaging Lessons
No Bus? No Problem! Bringing the Science Museum to Your Classroom
Teaching Green

PreConference

ISELA: Designing for Science

November 8, 2007
Thursday 9:00 AM - 4:00 PM Pere Marquette Hotel

Cost $75.00 in advance - please see the registration form

7:30 AM - Registration Opens
8:15-9:00 AM - Continental Breakfast
Lunch Compliments of ExploreLearning Inc.

9:00-10:15 AM - **The Fairchild Challenge of the Chicago Botanic Gardens & the Collaboratory Project:** Treenen Sturman, Educational Outreach Coordinator of the Chicago Botanic Garden & the Northwestern University Collaboratory Project

10:15-11:30 AM - **In Search of the Big Ideas of Science:** Susan Dahl, Fermilab Lederman Science Center & Tinely Park Science Teachers
The Fermilab and the Tinley Park School District explored building a curriculum based on the "Big Ideas" of science based upon the McRELL's Content Learning in science and other national resources.

11:30 AM-1:00 PM - **ExploreLearning Gizmos:** Robert Laundrie or CEO

ExploreLearning offers a catalog of modular, interactive simulations in math and science for teachers and students in grades 6-12. We call these simulations Gizmos. Gizmos are fun, easy to use, and flexible enough to support many different teaching styles and contexts. Gizmos are designed as supplemental curriculum materials that support state and national curriculum standards; in addition, Gizmos help teachers bring research-proven instructional strategies to their classrooms.

1:00-2:00 PM - **Planning Your School Science Lab Design & Communicating with the Architect:** Lee Jorik, Harry Kloeppel Assoc.

Planning your school science lab design and communicating with the Architect will include information on lab configuration, cost, flexibility, traditional labs, etc. and will also provide a free seventy page planning guide for participants.

2:00-3:00 PM - **DuPage Science Assessment Project:** Julie Gaubatz, Hinsdale South Science Chair and Lisa Fernandez, Hinsdale Central Science Chair
DuPage County ROE and the West Suburban Science Supervisors have invited regional high school teachers to join in a project that hopes to raise student achievement, strengthen curriculum and improve Biology instruction. Through this project, Biology teachers will discuss best practices for the teaching of Biology, identify a unifying vital curriculum, and design a common assessment that aligns with this vital curriculum. Results of this teacher-designed assessment will further discussions on curricula, instruction and student achievement.

3:00-4:00 PM - **Building a Community Relations Program for Science Educators:** Dave DiLorenzo, Minooka Community High School
Keeping your community informed of how its tax dollars are being spent on education should be a priority for every school district. Learn why teachers (especially science teachers) and what they do in the classroom is key to establishing and maintaining a community relations program that will make tax payers proud of their public school.

Exemplary Science Students!

The students listed below are only a few of the many Illinois science students who were awarded ISTA medallions and certificates. This award program is supported by contributions from the Illinois Petroleum Resources Board.

Top to bottom: Andrew Heffron, Highland High School; Amy Wang, Hononegah Community High School: Matthew Kahre, Chester High School.

Regina Wang	Adlai E. Stevenson High School
Alice Mao	Adlai E. Stevenson High School
Tsui-Mei Crystal Tan	Adlai E. Stevenson High School
Subhah Aganwal	Adlai E. Stevenson High School
Esther Divovich	Adlai E. Stevenson High School
Amelia Wallace	Adlai E. Stevenson High School
Jacob Exely	Belleville Township High School
Timothy Thurman,	Belleville Township High School East
Joseph Thurman	Belleville Township High School East
Kimberly Kort	Brooks Middle School
Alex Rahe	Carrollton High School
Allen Lawrence	Centennial High School
Matthew Kahre	Chester High School
Kathleen Adamczyk	Deerfield High School
Nick Farace	Genoa-Kingston High School
Hailey Fowler	Genoa-Kingston High School
Kayla Swenhaugen	Genoa-Kingston High School
Alexis Westerhausen	Girard High School
Traci Turnbow	Gwendolyn Brooks College Prep Academy
Lauren Diamond	Hall High School
Andrew Heffron	Highland High School
Akilesh Honasoge	Hinsdale Central High School
Matthew Leach	Hinsdale Central High School
William Sun	Hinsdale Central High School
Amy Wang	Hononegah Community High School
Brian Hybki	LaSalle-Peru Twp HS
Carly Swanson	LaSalle-Peru Twp HS
Roger Akers	Lawrenceville High School
Alyssa Zimmer	Maple School
Jordan Shapiro	Maple School
Shawn Kothari	Morgan Park Academy
Amy Daniels	Mt. Vernon Township HS
Anna Dikina	Niles North High School
Anna Karissa Reyes	Niles West High School
Drew Golz	Oak Park and River Forest High School
Samuel J. Novario	Ottawa Township High School
Brooke Patrick	Payson Seymour High School
Angela Hancock	Pekin Community High School
Molly Odum	Prairie Central High School
Elizabeth Eichorst	Providence Catholic High School
Ashley Adams	Rich Central High School
Krishna Bharani	Rolling Meadows High School
Cory Bosco	Roxana High School
Briana Mattingly-Kincaid	Shiloh School
Jonathon Ryherd	St. Aloysius School
Rebecca Thornton	Sycamore High School
Aaron Chamness	Vienna High School
Justin SidneyKosirog	Wheaton Academy
Austin Fess	Wheaton Warrenville South High School
Cole Lightfoot	Winnebago High School

Clockwise from left, top: Michelle Apple; Traci Turnbow, Gwendolyn Brooks College Prep Academy; Briana Mattingly-Kincaid, Shiloh School; Roger Akers, Lawrenceville High School.

Do *You* Know an Exemplary Science Student?

Remember, ISTA members in good standing, who would like to honor one high school science student each year, may request an **ISTA medallion and certificate** by contacting sherryduncan@insightbb.com.

This award program is supported by contributions from the Illinois Petroleum Resources Board.

Teacher - to - Teacher

Educators Share Information, Lessons, and Tips

Mary Lou Lipscomb
Illinois Mathematics and Science Academy

Professional development is more than participating in workshops. It involves all the ways that teachers learn to perfect their skills as educators. As lifelong learners, teachers accumulate a wide variety of knowledge and skills which are used to create ideas, activities, or entire units. Whether used to spark or maintain interest, keep things moving, or help students understand a concept in a way that is unique or different, sharing the ideas, activities, or units with colleagues provides professional development for all involved.

In this issue several teachers have submitted an activity, lesson, or tip that they have found to be successful. Each has been used at specific grade levels, from elementary through high school, but each could be adapted for use at other levels. Perhaps you will be able to incorporate one or more of the following ideas into your repertoire.

A sincere "Thank You" to those who submitted their ideas and information for this issue.

Classroom Management Through Team Work…
Kathy Costello, partnership supervisor at SIU Edwardsville, BaP key leader, and former middle school teacher writes, "Businesses, whether science-oriented or not, want employees who know how to be effective team members. Science labs and activities are a great place to teach and practice team skills. An added benefit is improved classroom control and more on-task behaviors.

"Here's a list of team work skills I taught to my middle level science classes:

- Move and talk quietly
- Ask for help
- Keep talk on task
- Stay with your team
- All participate
- Give help when asked
- Be supportive

"After teaching the skills the first few weeks of school, I periodically evaluated each team's efforts and gave points for the class participation portion of their grades. Making team work a part of the grade encouraged to students to take it more seriously."

There are many resources on team work and cooperative learning available on the Web. Kenneshaw University's site at http://edtech.kennesaw.edu/intech/cooperativelearning.htm is one that Kathy recommends. Others can be found by typing "cooperative learning" in the Google search bar at NSTA.org.

Quick Tips to Manage Your Classroom…
BaP point of contact and teacher at Benito Juarez Academy High School in Chicago, Yolanda Milan writes, "What has worked for me as a secondary science teacher is Popsicle sticks." She goes on to say that the students each write their name on a Popsicle stick. Yolanda then uses the sticks to keep track of class participation. A second tip Yolanda recommends is to begin the year with a discussion of classroom rules: Respect, Responsibility, and Readiness (together go over examples). Keep the three rules posted on the wall throughout the year.

Finally, Yolanda recommends having a contract between you, the students, and the parent or guardian, and to have it signed by everyone involved. She recommends, "Be assertive, firm, respectful, and have fun. Most of all, be prepared. Don't expect from students, that which you do not practice. Students are smart, and they will catch on. Your school year should go smoothly."

Organizing Equipment and Helping Students Find What They Need…
Christine Gregory a BaP point of contact at Heyworth High School in Heyworth has used the activity that she sent with students in grades seven through nine. She writes, "While chemicals should never be stored by alphabetical order, equipment and supplies really should. Doing so helps make students more self sufficient and able to set up and clean up for themselves. It also is a great activity for teaching the correct names for equipment.

"Suggested plan for doing this manageably:

- Assign each student or group of students to an item. They should use books and references to: 1) double check the name and spelling, 2) list three common uses for the equipment and 3) state a safety precaution that should be used when using it.
- Number all of your lab drawers/cabinets ahead of time.
- Give students a sheet with pictures of common lab items.
- Ask them to give the correct name for each

"Next have students take out their item and place them on the lab counters (or class tables) in alphabetical order. Then give them a precut label and instructions to neatly write the name of their item. When you have double-checked the alphabetical order, tell students what numbered location their item goes in. Have then put that on the label and place the label on the equipment.

"As an assessment, give the students a picture of a lab setup you would like them to put together. Have each student or group of students retrieve one of the pieces for the setup. Grade it on a 3 point scale:

3= stated the name and found it without asking a question in under 1 minute.
2= had to ask 1-2 questions, but was able to find it and state the name.
1= found the wrong item or name.
0=was unable to find the item or name.

"Result: students learn the proper names and way to put away materials, and you get an organized student friendly classroom."

Differentiated Curriculum…
Jennifer Timmer, a BaP point of contact and teacher at Winnebago High School in Winnebago, writes that she has seen the concept of differentiated curriculum presented in several different forms and she states that, "Dr. Kathie Nunley has presented this in the most usable format of all I have seen. Her books

on the subject are easy and enjoyable to read, and the content is easy to put into practice. (She is also hilarious to listen to as a speaker).

"The basic concept is to design a unit that is broken into three basic parts or layers, each layer offering choices for students to be able to use their strengths to learn a topic. They are presented as C, B and A layers. The C layer consists of information that is basic knowledge. The B layer takes the information from the C layer and applies it to new situations. The goal of the A layer is to make scientific thinkers of our students, to take the information and apply it to a situation. Many times the A layer requires looking at social issues that deal with a scientific topic, asking students to go beyond the basic knowledge.

"I have implemented a few layered chapters into my general biology class. The results were amazing. Students orally defend all of the information in the C layer; and I was able to correct misconceptions before they were locked into the permanent memory banks. Students taking the final exam made many comments on the parts of the final they remembered best were the chapters that were completed in layers. Because the layered curriculum focuses on the learning, and not on the work completed, many students that struggle with traditional schooling were starting to see how to study to learn and understand how they learned the most effectively.

"If you are interested in layered curriculum, I have several suggestions:

- Visit Dr. Nunley's website: www.help4teachers.com . It is full of examples for many grade levels and subject areas.
- Take it slowly, this is also emphasized by Dr. Nunley.
- Read her books on the subject, or attend one of her workshops. They are full of many tips, suggestions, and examples.

"You are welcome to contact me at TimmerJ@winnebagoschools.org , but I am just a novice using layered curriculum and believe the website is a much better source."

Moon Treasure Hunt…

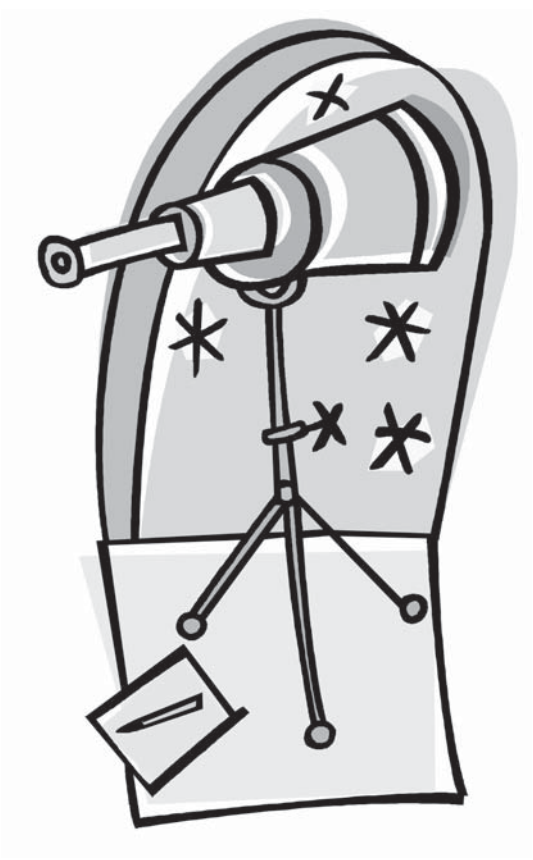
This lesson idea is from Renee Bearak a science teacher formerly at Ames Middle School in Chicago. Renee writes, "This activity has been used successfully by me with students in grades six, but it could be used at other grade levels as well. The lesson is based on information from a local astronomer, Necia Apfel. This activity is titled "Moon Treasure Hunt." It is a great introduction tool to the moons of the Solar System."

Make a set of twelve cards, each with a fact about the various moons in our solar system (the facts follow or you may come up with your own). Use 4" x 6" colored index cards or pieces of card stock or construction paper. Place the cards around your room. You will also need to create a worksheet (sample follows) for each child with questions that can be answered by reading the posted facts. The children will move from clue card to clue card searching for the answers to the questions.

Renee says, "This is a great warm up activity for an Earth/ space unit. My statements, or clues, are from a while ago, so you can change the statements to reflect the new knowledge we have received from NASA. Happy hunting!"

Moon Clues:

- Saturn's moon, Titan, is the only moon in the solar system with a substantial atmosphere. But its clouds are so thick we can't see Titan's surface.
- Saturn's moon, Mimas is a very small moon, but it has a crater that covers one-third of its surface. If the meteorite that crashed into it had been any bigger, it would have broken up Mimas and destroyed it.
- Jupiter's moon, Callisto, is so heavily cratered that no new craters can be created without destroying the old ones.
- Jupiter's moon, Europa, has no mountains or high hills. Its surface is so flat it is smoother than a billiard ball.
- Jupiter's moon, Ganymede, is the biggest moon in the solar system. It is bigger than Mercury.
- The Earth has only one moon, but it is big compared to most other moons in the solar system. Our moon is 25% the size of the Earth.
- Uranus's moon, Miranda, is believed to have been broken up and reformed so that it looks like a jumbled up jigsaw puzzle.
- Mercury and Venus are the only two planets that have no moons.
- Some very little moons orbit close to the edge of the rings of Saturn keeping the ring particles in their orbits. They are called *shepherd satellites*.
- Jupiter's moon, Io, has eight or nne active volcanoes with sulfur erupting from them. Io is called the "Pizza Pie Moon."
- Neptune's moon, Triton, has many different craters, geysers, and melting snow. Part of it surface looks like a cantaloupe skin.
- Saturn's moon, Hyperion, has been hit so many times and so it's so battered it looks like an overdone hamburger.



Worksheet For Moon Treasure Hunt

1. What moon has many active volcanoes with sulfur erupting from them? It is called the "Pizza Pie Moon."
2. What moon is smoother than a billiard ball?
3. Which is the biggest moon in the solar system?
4. Which moon has such a thick cloud covering we can't see its surface?
5. Which moon has so many craters that no new craters can be formed without destroying an old one?
6. Which moon has a surface that looks like a "cantaloupe skin?"
7. What two planets have no moons?
8. Name of the moon called a jigsaw puzzle.
9. Moons that keep ring particles in orbits are called _____
10. The name of the moon that looks like an overdone hamburger.
11. Of the moons, which has a crater that covers one-third of its surface?
12. What moon is 25% the size of its planet?

Inquiry Helicopters…
Cheryl Lynn Best a BaP point of contact at Wolf Ridge Education Center in Bunker Hill has used the activity she has shared with second grade students, but it could easily be adapted to other grade levels. A pattern for the helicopters and other ideas for activities using the helicopters can be found at the University of Georgia, Savannah River Ecology Laboratory web site http://www.uga.edu/srel/kidsdoscience/sci-method-copters/ .

Cheryl explains her activity as follows: "Students in groups of four were given five different premade "Helicopters" to test. Each helicopter was made out of one of five different kinds of paper. The students needed to complete a simple graph on the time it took each helicopter to get to the floor from a certain height.

- Helicopter #1 light weight paper
- Helicopter #2 construction paper
- Helicopter #3 cardboard
- Helicopter #4 poster board
- Helicopter #5 waxed paper

"Each helicopter was tested without a paper clip, with a small paper clip, and with a large paperclip.

"This activity gave my young scientists the skills of observation, data collecting, and questioning. Each group had to give their reason why they thought a particular material worked better than the others. (You could use any five different kinds of paper available.)

"After the activity was completed on day 1, each child had to create their own helicopter without a pattern. It was very interesting the different designs that were created! Some thought longer blades or shorter blades or a longer body or a shorter body would work better. We then discussed the results using their helicopters.

"I really found that this activity helped my students understand the importance of collecting data, testing data and using the data to create their own helicopters."

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If you have lab or classroom management hints, great websites you have used, science activities, lessons, or demos that you have found to be effective with your students, please send them to me electronically at lipscomb@imsa.edu .

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Building a Presence for Science

Mary Lou Lipscomb
BaP State Coordinator, Illinois

- Are you a member of the Building a Presence for Science (BaP) network?
- Do you receive your monthly "Network News" electronically and other email about professional development opportunities from me (Mary Lou Lipscomb)?

If your answer to the first question is "yes" and the second is "no," there may be two reasons you are not hearing from BaP on a regular basis.

#1: It might be that you have changed your email address and not updated your information. Login to the BaP web site and when you get to your page, click to change your contact information. After you have changed your information, be sure to click the "submit" button at the bottom of the page. If you don't know your password, contact me at lipscomb@imsa.edu and I will send you your login and password. Include your full name and indicate that you need your password in the body of the email message.

#2: Your school's or district's SPAM filter is not allowing the email to get through to you. You might try adding my email address lipscomb@imsa.edu to your address book, but if that doesn't work you will need to contact the person in your district who sets up the filters.

If your answer to both questions is "no" then check-out the updated Building a Presence for Science web page on the Illinois Science Teachers Association (ISTA) web site (www.ista-il.org) to find out more. Click on the NSTA/BaP logo and it will take you to the Building a Presence for Science web site where you can volunteer to be a point of contact in the BaP-Illinois network.

In addition to the direct link to the national BaP web site, the updated BaP-Illinois web page now includes a list of all of the current BaP state partners and links to their websites. Since the last issue of the *Spectrum* the Environmental Education Association of Illinois has become a BaP State Partner. Any organization or institution interested in being a part of the Building a Presence for Science network in Illinois is invited to check out the Opportunities and Responsibilities of BaP state partnership by going to www.ista-il.org and clicking on the link to Building a Presence for Science in Illinois and then State Partners.

Building a Presence for Science (BaP) is an electronic network initiated by the National Science Teachers Association and implemented in Illinois by ISTA to foster communication, collaboration, and leadership among science educators. Through the network, teachers and other science educators are provided with information about professional development opportunities and science teaching resources. Network participants also have the ability to share ideas and information with each other by using the BaP web site www.nsta.org/bap to send email or by posting ideas or questions on the Illinois message board.

The BaP network is growing in Illinois and if you are not member, you are encouraged to participate. Our ultimate goal is to have a point of contact in every school in Illinois. Points of contact are seen as communicators, leaders, and advocates for standards-based science education. As each school joins the network with a point of contact, Building a Presence becomes a more powerful means of communication among science educators. For more information about BaP-Illinois go to www.ista-il.org and click on the link for Building a Presence for Science.

Articles

Moving Beyond Simplistic Pedagogy in Teaching Science

Dr. Richard A. NeSmith
North Greenville University

If you ain't listenin' then you ain't learn'n.

It was some time during my freshman year in high school that I encountered a decorative plaque on the wall of my teacher's classroom. I remember it because it was very colloquial in nature and the teacher referred to it frequently. The adage read, "If you ain't listenin' then you ain't learn'n." It made sense at the time…and it was a good "tool" in calling for our attention in class. It, however, does not hold up against the evidence cognitive researchers have bared in the last decade. These perceptions, in fact, are misconceptions which prevail inside and outside of the educational profession (Labaree, 2004). The most effective teachers know their content, but knowing one's content does *not* make one an effective teacher. "Teaching requires considerably more than delivering subject content knowledge to students"…according to Loughran, Berry, and Mulhall (2006), and "student learning is considerably more than absorbing information for later accurate regurgitation." In practice, students might be "listenin'" but not "learnin'." Likewise, I might be telling (that is, talking!) students the factual science content but not really "teaching."

What We Think We Know About Teaching

We need to advance our concept of teaching to the next level. Teaching isn't, and never has been, simplistic. Teaching, in fact, is *problematic* for it involves interactions that are frequently unpredictable. The teacher, learner, and content all interact with the class and school and community environment. Learning styles, multiple intelligences, and ethnic paradigms all intermingle in this concept of teaching. In science methods courses this author has taught there was the need to provide students with pedagogical strategies to assist them in their rookie status as upcoming teachers. It was a greater challenge to teach methods to elementary pre-service teachers for their deficiencies in science content and processes. Middle school pre-service science teachers were much better prepared; however, there the pendulum had moved to the other side of the spectrum to that of practioners needing structure and classroom management skills. This mandated the instructor of methods courses to attempt to provide structural strategies by helping students realize the benefit of classroom procedures. It is accurate to say that middle school students, especially, need procedures and routines in order to have a sense of feeling secure and in a safe learning environment. The outcome, however, is that many pre-service teachers left such courses (and these are not restricted to just science methods courses) with the notion that effective teaching is simply establishing procedures and routines. The point is that teaching is not so

... telling is not teaching, and listening is not learning

simple. It is problematic. Giving future teachers a sense of structure is a perfectly acceptable *start*. The key word here is *start*. Methods and structure are baselines, at best. Those individuals who graduated and became teachers did not become effective if they simply maintained that level of expertise. *Contrary to common belief*, if they did not recognize in the first few years in the classroom that the initial simplistic view of teaching must be confronted, then they have failed to reflect on their own professional immaturity…for telling is not teaching, and listening is not learning.

Recall your first few years of teaching. For some that was a long time ago. For others it was rather recent. What did you learn about teaching that first or second year? No! I'm not talking about how long you realized 180 days could be! I mean…you, as a professional. I would not speculate what the stages of growth would be but there most definitely are stages. This author recalls how "overzealous" he was that first year. Poor students! I learned that first year that what I did in college science was not generally appropriate for seventh graders. My problem was not lack of scientific knowledge or lack of zeal. My dilemma was just a lack of true pedagogy. I learned that pedagogy is not simply establishing procedures, having an arsenal of tricks, activities, models, or worksheets. Professional pedagogical content knowledge (PCK) is more than expertise in science. It involves recognizing my own incongruities and realizing that teaching is complex and *problematic*. As a middle school teacher you not only have to contend with your own knowledge and emotions, but those of the students. You have to contend with gaps in their understanding, their concentration, and the educational bureaucracy which, on the positive side "leaves you alone," but on the negative side, "leaves you alone." Support? Not in my nearly twenty years of classroom experience. Teaching requires that one ascertain where the students are, and in spite of all the internal (hormones) and external factors (bullying, crime, drugs, television, attitude, peer pressure [yours *and* theirs], lack of funding, parental support, compulsory clientele, and more isolation than you ever dreamed of), and a hundred other issues, you, as the teacher, must inspire and instill a desire to learn. Our error often lies in trying to make it simplistic. There is nothing simplistic about it. Teaching is not telling, nor is it simply incorporating a range of teaching procedures.

If we are going to be successful and effective science educators, then we must move beyond simple delivery. We must recognize that pedagogical content knowledge is a *journey*, not a destination. We want our students to become *lifelong learners*, but this will not happen if we are not lifelong learners. Lifelong learners *reflect*, and then they *change*. Until we recognize that the traditional misconception that teaching is the *transfer of knowledge*, we will continue to see our students falling further and further behind the rest of the world. Teaching strategies are important, but they are not the key to effective teaching. Procedures and routine are useful and have their place, but too much creates boredom and results in students mentally, if not physically, checking out.

What We Have Learned About Teaching

We have learned that teaching is complex and problematic. The number of variables can be overwhelming, but the bottom line is that teachers must grow and mature in pedagogy as much as the preadolescent must grow and mature into an adolescent. Teaching must go beyond teaching

Students need to understand science more than they need to be able to regurgitate isolated facts.

procedures. Students need to *understand* science more than they need to be able to regurgitate isolated facts. The complexities that students need to be able to do and to adapt within the real world are not being addressed in most classrooms. You can "tell them" all you want, but you are not teaching. And, they may be listening but that does not mean they are learning.

We have learned that teaching requires that students become aware of what they are doing and why they are doing it. They must question their own learning, build their knowledge by processing, synthesizing, and linking the new ideas and concepts with those they already possess. Teaching is creating meaningful opportunities for students to be engaged in constructing and restructuring their own knowledge. Herein, lies the paradigm that teaching is not simply delivery of information and *one cannot mandate quality learning* for quality learning requires *learner consent*.

Haven't you ever had that feeling, that notion, that *if I could just tie that student in his/her chair and get them to listen they would excel*? Well, even if you could you would not succeed for you must have the learner's consent. For most of our students, we do not. We continue to try to transfer knowledge from a textbook to their heads and it appears, at least to the students as pointless. So often we hear, to our dismay, how boring or senseless content is. And, oh, that "Why do we have to do this?" syndrome. Why do we get such feedback? It is not because they are not capable. It is not because they are stupid. It is not even that they are lazy…watch them at recess! It is because we have faded into the sunset of an old paradigm that learning is passing tests: standardized, homogenized, and sterilized. We (teachers and non-teachers, alike) applaud those who pass such tests as being *successful* students. They, in fact, are not. They are, however, good *test-takers*. You know them…they excel…at taking tests. Ask these students a question six weeks later and they will tell you that they do no remember but they did *learn it for the test*. The problem with the "transfer" concept is that it is not relevant to life experiences and students have no ownership of their learning experience!

The misconception lies in misinformation that a correlational relationship actually exists between standardized test results and grades, and standardized test results and achievement (Hoxby, 2003). If this were so, then simply administering standardized tests would be sufficient to issue a student a grade if, in fact, it measures student achievement. In practice, however, grades actually reflect achievement in that a specific set of objectives were made known and were then met. Standardized tests, however, only reveals: 1) what the student does not know and, 2) only what is not known in

... teaching is not simply delivery of information and one cannot mandate quality learning for quality learning requires learner consent

The misconception lies in misinformation that a correlational relationship actually exists between standardized test results and grades, and standardized test results and achievement.

comparison with a student's peers. The most benefit standardized testing could provide is the practice of using the results in comparison with the same student's previous testing results. As a few districts begin this practice, they are discovering that top students improved less than other students in the past two years, whereas mainstreaming is improving scores among students with disabilities (Hu, 2007). Instead, it is used today as a means of "norm-referencing" grading (Brookhart, 2004). Only the grade never reaches the report card. The high-stakes testing movement is not research-based and it is not preparing our students to be globally competitive (Gouthro, 2002; Labaree, 2004; Newby, 1999). It is, rather, a revival of the *teaching is transfer of knowledge* paradigm which is built on the faulty misconception that intelligence is fixed at birth, thus IQ testing which served as a model for the SAT; Ravitch, (2001) and secondly, that the brain is a muscle that needs exercising. And, eventually, even many of the good *test-takers* will burn out from the overuse and overemphasis on standardized testing (Esquith, 2007).

We have learned that pedagogy has more to do with the relationship between teaching and learning in ways that foster student's development and growth. Pedagogy problematizes the conditions of appropriateness of educational practices and aims to provide a knowledge base for professionals (Van Manen, 1999; 1995). We have learned that pedagogy is not *static* for it faces an ever-changing, and sometimes unpredictable, set of variables that require the teacher to utilize research-supported strategies and practices, but in a fluid and eclectic manner, so as to adapt the principles of pedagogy to the situation at hand. It requires knowing what is research-based, but it is also utilizing professional experience and wisdom in order to accommodate the moment. Professional and effective teachers move beyond simplistic pedagogy. They "break the set," so to speak in that they can adapt to unforeseen challenges while moving from a sense of confidence in a particular practice to a riskier situation characterized by uncertainty. They recognize the need to make reflective changes, knowing that covert resistance is a typical response made by learners who have been anesthetized by an educational system which fosters, traditionally, passive practices, low expectations, and testing frenzies. Resistance, however, is neither "good" nor "bad," but just a normal fearful response to change (Janas, 1998; Marshak, 1996). Effective pedagogy enlightens and those who are moving beyond simplistic pedagogy have a heightened awareness that routine can quickly dissipate when the expectations of learning shifts as a consequence of teachers using approaches to teaching with which students are unfamiliar. And yet, it is the reflective adaptations made by the recognition that interaction between teaching and learning requires one to alter, change, or revamp what most would consider a very good teaching method, which challenges the status-quo, and shifts the purpose of learning. Teaching is not telling.

I recently had a situation in which we had a male student in a field experience. Fortunately, this was prior to student teaching. As he sought to experience the interaction between teaching and learning, he encountered a great deal of frustration. Upon having a professor observe the student, the problem became clear. As he taught he encountered students who did not understand some concept. His strategy to help the student comprehend was to *repeat the same words he had already said, but at a slower pace and louder volume*. As you can imagine, this did nothing to "enlighten" his students. This may seem to be a poor illustration of present practices…but I have seen veteran teachers practice the same "strategy." Proper pedagogical knowledge requires teachers to be willing to leave their comfort zone and the comfort zone of their students in order to enmesh multiple paths, while developing purposeful entry points into learning through dynamic interchanges between knowledge and processes, teacher and student, and teaching and learning. This is far from the "busy work" that is stereotypical of regular school learning.

What We Need To Do About Teaching

We need to change. Leaving things the same, even with the most qualified teachers, does not improve the system (Rossi & Grossman, 2007). Change is automatically happening all around us. Automobiles are changing, construction techniques have changed, fuel and food have changed, demographics are in a flux of change, and technology continues to change at break-neck rates. Education, however, seems to refuse. For most of us changing our actions are not easy. Typically, we are not comfortable with [most] change. It does seem to be a "selective" choice. Sure, schools now have technology in our classes, but for the most part education has withstood change, only to awaken as a dinosaur out of time. Biology teaches us that those organisms which refuse to change become extinct. As globalization rapidly spreads, whether we like it or not, the world and the way it functions are changing. American education can no longer ignore the international relationships interdependencies, and eroding boundaries creating a global market in a global economy (Gutek, 1993). One politician said, "If we want Americans to accept the rigors of globalization, then we will need to make that commitment" (Obama, 2006, p. 186).

We need a vibrant conceptualization of pedagogy where we question what we do and why we do it (Loughran, Berry, and Mulhall, 2006). This is nothing new, just not widely practiced. For our students to truly succeed we must move beyond *activities*. We need to move beyond simplistic *strategies* that we plug into routine situations (Loughran, Berry, and Mulhall, 2006). We need to move beyond outdated curriculum that promotes memorization of isolated facts for the sake of filling the head with detached mental backwash, and tests that encourage rote memorization (Goodlad, 1984). We need to utilize our experiences, training, research-based practices, and our own professional wisdom in order to provide students with the knowledge, skills, and practices that they will need in the near future to succeed.

The outcomes of research and professional learning can be powerful driving and sustaining forces in developing practices and mind-sets of new ways of conceptualizing content, teaching and

Leaving things the same, even with the most qualified teachers, does not improve the system.

As globalization becomes a dominating force we will see changes.

learning. We need to better articulate our own learning about practices, sharing such knowledge, and not professionally slighting or demeaning those who are willing to think *outside* the schoolhouse box.

As globalization becomes a dominating force we will see changes. These changes will be very clear to those of us in the United States. Should our schools and our students continue on the path that we now tread, we will continue to lose ground, academically and economically. As standardized testing takes its toll, placing more blame and responsibility on teachers and less responsibility on the student (Labaree, 2004), and fewer and fewer American students will graduate from high school, and many of those who do but have failed to conceptualize, synthesize, or evaluate what they have learned, then we find the downward spiral to send the nation further and further behind, much like matter pulled down into a celestial black hole.

Change is about reflection and adaptation. Change will require work. It will mean moving out of my comfort zone when opportunities make themselves known. It may mean discarding my wonderful and colorful PowerPoint presentations simply because it actually promote passive "canned" presentations as opposed to unpredicted and unexpected interesting discussions that might move in directions that I may not be prepared for or comfortable discussing. Change may need to come about by my voicing my concerns and disapprovals for poor pedagogy, bad practices, and overuse of testing, which some propos actually "hurts kids rather than help them" (Levine, 202, p. 335). It may be that in order to better my students better I will have to decide if I should teach them how to think critically and conceptually or how to take tests? Teaching conceptual thinking skills has been shown to be the first step to closing the minority achievement gap (House, 2006). The key will be in what serves them and our nation best. Change may require that I create my own authentic assessments, evaluation instruments, and/or seek to have my school utilize diagnostic testing as opposed to present practices. The National Commission on Teaching and America's Future (2003) identified the need for multiple assessments that center on student learning as missing in our present educational systems. We so often fail to see academic improvements because we fail to utilize built-in assessment for "corrective action" (Goodlad, 1984). And, we have not shown much improvement in this area, even with the new technological advances.

We need to change *what* we teach and *how* we teach it. We need to assess what we have done and what needs to be accomplished. We should invest less funding in standardized testing and more in such research-based strategies as proposed by Marzano (2003) and Marzano, Pickering, and Pollock (2001):

Identifying similarities and differences
Summarizing and note taking
Reinforcing effort and providing recognition
More focus on useful homework
Cooperative learning
Clarifying learning objectives and providing useful feedback that alters instruction and facilitates student achievement
Generation and testing of hypotheses
Questioning skills, cue, and advanced organizers

Change must involve moving from the paradigm that teaching is telling and learning is listening. Learning how to teach is much more than collecting a set of activities to use in the classroom,

establishing routines and procedures, and attempting to superficially discuss everything in a textbook. Ideally, teachers understand how students learn and recognize a number of factors that impinge on the quality of students' learning; and, on the basis of that understanding, choose and employ teaching procedures and approaches to promote quality learning. Teaching is problematic and teachers who teach for understanding develop professional knowledge about teaching and improve their practice on the experiences and insights of other teachers. This commonly involves trying to think about teaching and learning from different perspectives in order to develop deeper understandings of teaching and learning situations (Loughran, Berry, and Mulhall, 2006). Sharing ideas about teaching and learning continue to be vital, but more action needs to be taken to ensure that we move the educational pendulum back to the side of *teaching* and *learning* and not boredom. The paradigm shift from *transfer* to conceptualization must occur if our students are going to be able to adapt to the changes of a changing world that has entered a highly competitive global market. Our present practices are good…but they need to be great or we continue to lose ground. Our pedagogy of teaching and learning needs to catch up with the Twenty-first Century. Our students desire it, we know we need it, and our country's security requires it. It will not, however, occur unless you, as a science educator challenge the *status quo*.

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Write for the *Spectrum!*

The *Spectrum* is actively seeking articles, tips, announcements, and ideas that can be shared with other science teachers. Articles should be sent to the appropriate area focus editor, listed below. Other submissions and inquiries should be addressed to the editor, Judy Scheppler, at quella@imsa.edu. Please send all submissions electronically. Further information about writing for the *Spectrum* can be found at: www.ista-il.org/spectrum.htm

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Space Academy for Educators: Nine Illinois Teachers Go To Huntsville

Joy Reeves
Claremont Academy in Chicago

Space exploration is part of our lives.

"You are go for EVA."
"Roger that."

The Canada arm swings outward with a space-suited teacher perched precariously on the end. Nancy Clark, of Gallistel Academy in Chicago, works methodically to connect cables and panels to a tethered satellite while Joy Reeves, of Claremont Academy in Chicago, hangs from a cable to construct a conduit. Pam Meckler, of Grayslake Middle School, monitors vital signs while testing equipment.

This is one activity in a week long Space Academy for Educators, sponsored by the Honeywell Corporation. Ten teachers from Illinois were selected from hundreds of applications this past summer to be part of the more than two hundred teachers from around the world who came to the US Space and Rocket Center in Huntsville, Alabama. We spent a week immersed in space science, mathematics, and technology lessons in the *Exploring Space: The Classroom Connection* program.

Space exploration is part of our lives. Many of us grew up dreaming of traveling off the planet and now this fantasy comes to life. As a member of an international team, you take part in a one-hour simulated space shuttle mission, complete with flight suit, headsets, orbiter, space station and "Houston, we have a problem." You can be the pilot, commander, mission specialist, or have a job in Mission Control. Your team works together to complete the objectives of the mission, whether it is making a satellite repair or construction on the ISS. Problems are solved through experimentation or creating a solution with your teammates. The mission experience is realistic, exciting, and challenging!

Another day you imitate walking on the moon, maneuver in an MMU (Manned Maneuvering Unit) suit, and take a whirl on the multi-axis chair. You spend a sunny afternoon at Aviation Challenge simulating what it would be like to land in the water with a parachute or be rescued from the water by a helicopter.

In addition to the mission and outdoor activities, you attend workshops with activities designed to be implemented in your classroom. Engineering design challenges test your ability to construct a working water filter out of plastic soda bottles, charcoal, and other common materials, or design a lander to protect an egg dropped from the balcony. Figuring out the size and placement of fins improves your paper and bottle rocket flight at launch time. Other sessions include astronaut speakers, updates on current NASA projects, and information about the Educator Resource Centers

available all over the country. Each group designs a mission patch, which is converted to one you can sew on your flight suit.

Teachers share their ideas and pictures for sponsoring a Space Week at your school. With this October being the fiftieth anniversary of the launching of Sputnik, we got ideas on how to incorporate social studies with science. All in all, we'll go back to our classrooms not only with new knowledge and tools, but with the added edge of actual hands-on experience.

Space Academy for Educators is offered in June and July. All transportation, housing, materials, and meals are included in the Honeywell scholarship. Teachers sleep in the dormitories at the University of Alabama in Huntsville, about a mile away from the US Space and Rocket Center. Meals are cafeteria style in the Astrotech building.

Joy Reeves in the helicopter resuce basket.

You can attend Space Academy for Educators without a Honeywell Scholarship. Information is at www.spacecamp.org. Applications for next summer's Honeywell scholarships are due early January 2008. There are only two questions on the Honeywell application:

- What obstacles do you face in providing content and teaching methodologies that could improve the quality of math/science teaching in your classroom/school?
- Employment opportunities are increasing globally in the fields of science, math, engineering and technology. What can an individual teacher do to help meet this demand, and what kind of solutions might the education system employ?

Space Academy for Educators is more fun than you can imagine. All systems are go!

The Illinois teachers who went to Huntsville in Summer 2007 are Nancy Clarke of Chicago, Joyle Goeken of Troy, Milton Harris of Park Forest, Anne Matousek of Freeport, Pamela Meckler of Round Lake Beach, Matt Olejnik of Naperville, Joy Reeves of Homewood, Tami Roach of Litchfield, Christopher Schieffer of Chicago, and Sharon Schmitz of Pocahontas.

Reeves and Matousek attended Space Academy for Educators in previous years. Summer 2007 they were a part of the Elite 35 chosen for the Advanced Academy for Educators. This was a two week session which included a trip to Kennedy Space Center, scuba diving in the Neutral Buoyancy Tank, F-18 fighter jet simulations, robotics challenges, and a three-hour simulated space shuttle mission.

More on Scientific Literacy: Suggestions for the Classroom

Kent Schielke
Ss. Peter & Paul School

Connecting Science and Society

Pick up a major newspaper on any given day, and there are likely to be half a dozen articles reporting on subjects like a new study about the cause of autisms, which foods provide cancer fighting chemicals, or a new threat to the environment. In addition to the scientific research reported in the technical, peer-reviewed journals, the news media provide us with a steady stream of science news intended for the general public.

I tell my junior high students that I hope most of them will become "professional" scientists when they grow up. But if they don't, most of the new science information they acquire after completing their formal education is likely to be what they hear or read from the media. Will the information be accurate? Reliable? Complete? Will they be better informed citizens in a position to make good decisions about their tax dollars, personal health and public policy? Or will they be confused or misled?

One of our many professional responsibilities as science teachers in Illinois is to meet the standard of helping our students make the connection between "science and society." To address this and to promote higher critical thinking skills in my students, during the past two years I have created some programs within my curricula to try to raise my students' level of scientific literacy.

What's in the News? Is it "Scientific?"

I started the first one in January 2006 for my eighth grade students, and I call it simply "Science in the News." On one day each month during the school year, four or five students take a turn presenting a story from the popular media (newspaper, recent magazine, or internet news service) which reports on a recent scientific study or experiment. The study or experiment must state some type of conclusion or hypothesis made by the researchers as an explanation for the reported data. Examples might be: "Researchers contend eating French fries leads to cancer," or "Study shows polar bears dying because of global warming." The students are required to bring a copy of the news report to class, along with a paper they have written critiquing the article. Their critique must be in two parts: one on the science of the experiment or study itself, and the other on the quality of the news reporting.

The news media provide us with a steady stream of science news intended for the general public.

Early in the eighth grade, we spend several weeks discussing the principles of experimental design. This is more than just a rehash of the scientific method, as we try to study in depth different kinds of experiments with different objectives, and different types of data and the purposes for which they might be collected. What is the key variable we want to study? Why? What are the likely other variables we will need to control? Why? How we will control them? What kind of data are we likely to collect? Does it address the question of the experiment? Are we able to reach a reasonable conclusion from such data? Critiquing news stories from the perspective of "what is good science?" is meant to both a continuation and reinforcement of these initial lessons, as well as an opportunity for the students to test their thinking against real world situations.

I also want to encourage my students to be healthy skeptics ... critiquing the reporting ... force them to ask tough questions of the people conveying this information to them.

Looking for Informed and Unbiased Reporting

But I also want to encourage my students to be healthy skeptics, and so the second part of the assignment, critiquing the reporting, is meant to force them to ask tough questions of the people conveying this information to them. Does the reporter seem to know what he or she is talking about? Do they ask and answer all the questions we, as students, taxpayers or consumers, would want to know about the experiment or study? Do we know who the researchers are, where the study was conducted, the subjects, the time period, the controls, the background science of the subject, and enough in-depth detail to explain it to the lay person? Who is sponsoring the research? Is there any possible bias by the researchers? What are other scientists' opinions or contradictory research? Does the reporter have his or her own bias on the subject? What kind of tone does the writing have?

The students are expected to be ready to answer my and their classmates' questions, as well as summarize their own questions and opinion about the importance of the research and the quality of the news story. This is often a challenge because, as you might expect, eighth graders are still learning to be as complete as they need to be, and they will sometimes write a paper simply repeating the details of the news story more than giving their own critique. But the best of the reports provoke quite a bit of discussion among the class, not just because of interest in the particular subject of the research, but often because of the holes in the news story. Among the students, there is often serious disagreement about whether the holes are due to the quality of the science and the conclusions reached, or the quality and completeness of the news story printed. On many days, the students leave class continuing to discuss and disagree about what is the right conclusion, a result I view as a highly successful lesson and proof that students at the junior high level are capable of recognizing and analyzing complex issues.

Raising Awareness of Historical Context

Just as in fiction literature, true literacy in science also consists of having a contextual familiarity with certain images, ideas, vocabulary, and people on sight and hearing, without the need for a repeated, detailed explanation of their meaning. For me, another concern and another aspect of science literacy has been to increase my students' awareness and knowledge of the history of science. In the past, some of this awareness may have come within the general study of history, but I believe reinforcement is needed. So starting in August 2006, my seventh graders have been taking turns giving a short report on the "Scientist of the Week."

Their mission is give a short biography of a deceased scientist of the past, not merely summarizing the facts of their life, but emphasizing their important scientific work and why it matters to us today, putting it as best they can in context for that person's field of study. I encourage them to tell us about someone with whom they and we are probably unfamiliar, and to tell us, "What makes this person worth knowing about?" To keep the process orderly, I have made it generally chronological. Students assigned to report in the first quarter choose a scientist who lived prior to 1700; in the second quarter, 1700 to 1800; in the third quarter, 1800 to 1900; and in the fourth

quarter, after 1900. They must give me some advance notice of their intended choice to avoid repetition with their classmates. Some of the students' choices have been very interesting – ranging from Ptolemy, Archimedes and Copernicus, to Robert Boyle, James Watt, and Bernoulli, to Madame Curie, Jonas Salk and Enrico Fermi. Our use of this is still evolving as students learn how to look for and assess information on the impact and importance of a particular scientist's work, as well as staying focused on writing their own assessment rather than just copying that of someone else.

Understanding Technology as the Application of Science

Of course, we can't leave out the sixth graders. Since their range of conceptual and abstract thinking varies enormously, I have tried to encourage their scientific literacy by strengthening the concrete connections between science and technology. To accomplish this, they take turns reporting on the "Invention of the Week." The students are directed to research the common public news medium of their choice, such as newspapers, popular magazines, or major Internet news services. I ask them to look specifically for stories or reports about new or recent inventions, or important innovations or improvements of hardware like machinery, tools, consumer products, medical or scientific devices, computers, and communications equipment. I also ask them to avoid things like new or improved versions of computer or video games or other common software, unless it marks a real innovation or a marriage of technologies or knowledge not thought of before.

We spend quite a bit of time discussing the differences and similarities between invention and innovation, and whether something is really new or not. These discussions also tend to enrich the students' thinking about the inventive process, and the real-world variations and flexibility in the scientific method, which is not just one way of experimenting. Some of the examples students have found include sonar devices in cars to warn you of animals ahead of you on the road at night, and microchips for GPS location imbedded in clothing fibers to keep track of where young children are.

I've also given the students a chance to be inventors themselves. Once a year, our school holds a visiting Grandparents' Day. Last year I challenged the sixth graders to imagine serious inventions they thought could be useful to their grandparents as senior citizens. Some were impractical (or downright silly), but some of the students' ideas, though simple, were very thoughtful: digital water temperature controls for the shower to avoid hot water burns; pressure activated slippers with headlights to light your way down the hall at night; or simply placing molded seats in the corners of elevators (like those in a shower) to give seniors a rest on long elevator rides.

A Stepping Stone to the Real World

All of these programs – "Science in the News," "Scientist of the Week," and "Invention of the Week" – remain works in progress. But I think my students are taking some significant steps forward in understanding better the complexity of scientific study in the real world, as well as the variety and ambiguity of questions one can and must ask about what kinds of scientific research are being done in that real world, how it's being done, how the information gathered is or can be used, and how well it is getting to us and being explained to us. As I constantly exhort them, the smartest people are not the ones who think they have all the right answers, but the ones who keep asking all the right questions. I hope my students are learning to ask the right questions.

Author Information

Kent Schielke has been teaching junior high science for the past four years at Ss. Peter & Paul School, a K-8 Catholic elementary school within the Diocese of Joliet. For the twenty-five years prior to that, he practiced law in the Chicago area for a large international engineering/construction company, and then received my M.A. in education at Benedictine University in Lisle. He lives in Naperville, is married with two grown children, and is a member of ISTA. Kent can be reached at schielkesspp@yahoo.com.

Author Guidelines

Share with us your teaching ideas for curriculum, laboratory experiences, demonstrations, assessment, portfolios, and any innovations that you have found to be successful with science students. Photographs for the cover are also needed. Please send to the editor, Judy Scheppler, at quella@imsa.edu, or to the appropriate area focus editor. Your manuscript should:

Be typed or printed, double-spaced copy with standard margins,

Be less than 3000 words in length, although there is no strict length guideline; articles of substance of most any length will be reviewed and considered for publication,

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Include a title page with the author's name and affiliations, a brief biographical sketch of three or four sentences, home address, home telephone number (If there is more than one author, send all information for each), and email address (if applicable),

Include sketches, photographs, figures, graphs, and tables when appropriate. These should be numbered and referenced in the text by number. Any sketches, figures, graphs, or tables should be included at the end of the document on separate pages. They should not be embedded in the text. Photographs should be jpg images, included as separate files. Photographs, sketches, and so forth should be back and white, of good composition, and high contrast,

Include references if necessary, in the format of your choice (APA style is preferred),

Include a statement indicating whether or not the article has been published or submitted elsewhere.

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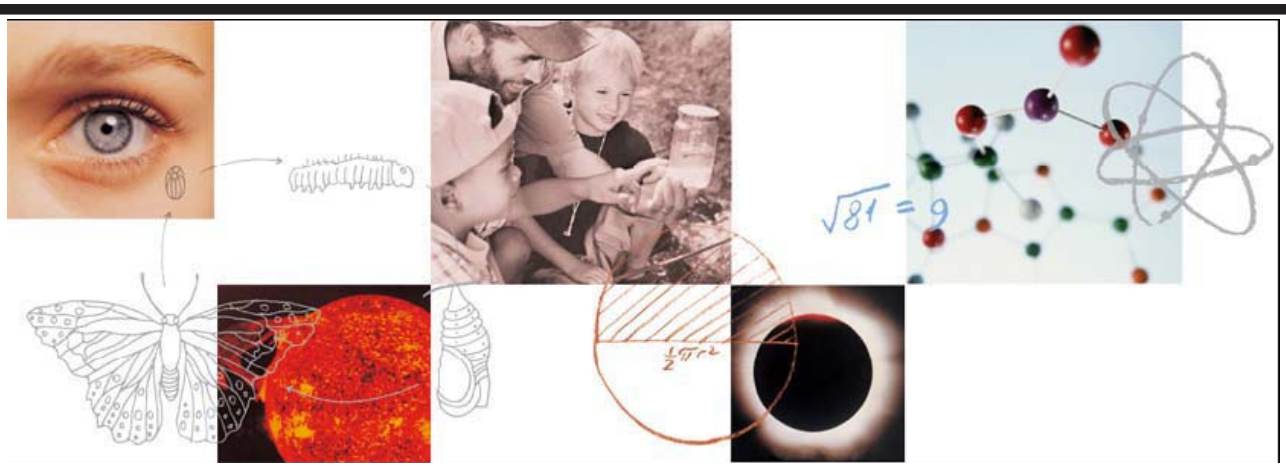

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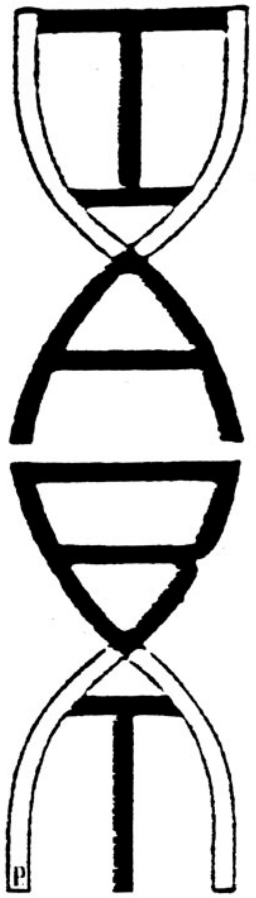

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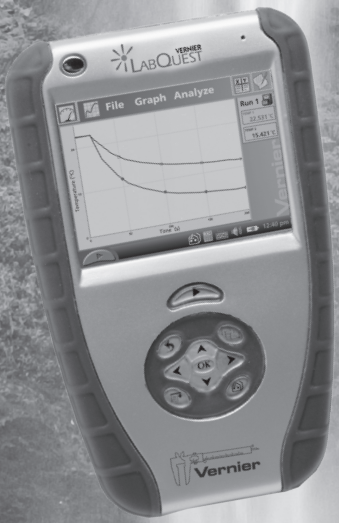

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Advance Registration Deadline 10/27/07
ISTA Member - $115
Nonmember (includes membership) - $150
Full Rate Registration After 10/27/07
ISTA Member - $125
Nonmember (includes membership) - $160

See conference information in the front of this issue for further details and registration form.

Above: Joy Reeves on a space walk.
Left: Pam Meckler monitors EVA systems.
See article on pages 33 - 34, *Space Academy for Educators.*

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