SPECTRUM

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The Journal of the Illinois Science Teachers Association

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Laboratory Safety

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ISTA Conference - November 2-4, 2006

Spectrum

The Journal of the Illinois Science Teachers Association
Volume 32, 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: Teachers partcipating in the IMSA E2K+ Program's *Biotechnology Explorations* conduct a hands-on laboratory, extracting DNA from various sources. Note the laboratory safety features, and see *Start the Year Safely* on page 33. Photos by Ray Dagenais and Judy Scheppler.

The *Spectrum* is printed on recycled/recyclable paper

SPECTRUM

The Journal of the Illinois Science Teachers Association

Fall 2006 Volume 32, Number 2

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President's Corner

Raymond J. Dagenais, Ed.D.

Illinois Mathematics and Science Academy

Thoughts of lemonade, swimming at the beach, warm breezes, and other remembrances of summer have been replaced by the sights and sounds of the new school year. Many ISTA members take advantage of the summer to explore and expand their understanding of the subject matters that they teach or related areas of interest. Vacations can incorporate trips to national parks, conservation areas, or museums. Some individuals may enroll in coursework during this time in order to learn something new. The point is that this is a time for rejuvenation and growth.

However, time devoted to professional growth should not be relegated solely to the summertime. One of the best opportunities to engage in professional development activities is to attend the annual ISTA conference. This year's conference, A Vision of Excellence: Building the Future Through Science Education, will be held in Peoria, Illinois from November 2-4, 2006. The Thursday pre-conference schedule includes a workshop for middle school teachers, run by NASA, as well as educational excursions for elementary and high school teachers. These experiences promise to be very interesting and worthwhile.

The opening of the exhibit hall at the Peoria Civic Center at 4 PM on Thursday will be marked by a social function sponsored by Prentice Hall. Make plans to buy a ticket and to attend the luncheon on Friday at the Hotel Pere Marquette, the conference hotel. Be sure that you mention that you are attending the ISTA Science Education Conference to get the special rates. Breakout sessions on Friday cover the range of scientific disciplines and pedagogies. The breakout sessions and workshops are designed to deliver well thought-out and prepared materials and ideas. Veterans of ISTA conferences also enjoy the informal learning that takes place between sessions and after hours.

One of the many highlights of the conference will be the gala event with dinner, dancing, and a museum tour to be held at the Lakeview Museum of Arts and Sciences. Sponsorship by ExxonMobil has enabled a reduction in the price of a ticket for this event. Saturday morning begins with the ISTA general membership meeting. A much anticipated part of this meeting includes the door prizes supplied by the vendors who support ISTA.

This year's conference promises to be a wonderful and enriching professional development opportunity. More information about registration and lodging can be found within the pages of this issue of the Spectrum or on the ISTA website http://www.ista-il.org. I am eagerly looking forward to this year's conference and I hope to see you in Peoria.

Yours truly,
Ray Dagenais

2005-07 ISTA Executive Committee

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dengel@mchs.net

Secretary
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University
mlisowski@eiu.edu

Welcome Donna Engel and Sher Rockway!

The Illinois Science Teachers Association welcomes Donna Engel to the ISTA Board. Denny Moore is moving on to other professional pursuits, and Donna will be filling the role of ISTA vice president through March 2007. The Board thanks Denny for his service and commitment to ISTA.

Sher Rockway is taking over for Eeva Burns, as ISTA's Awards committee chair. Eeva has done an outstanding job in organizing, promoting, and managing all of our various awards. Many thanks for a job well done!

The entire ISTA Board looks forward to working with you.

2005-07 ISTA Committee Chairs

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Awards	Sher Rockway
Convention	Executive Director
Finance	Vice President
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Region 3 Director 05-07
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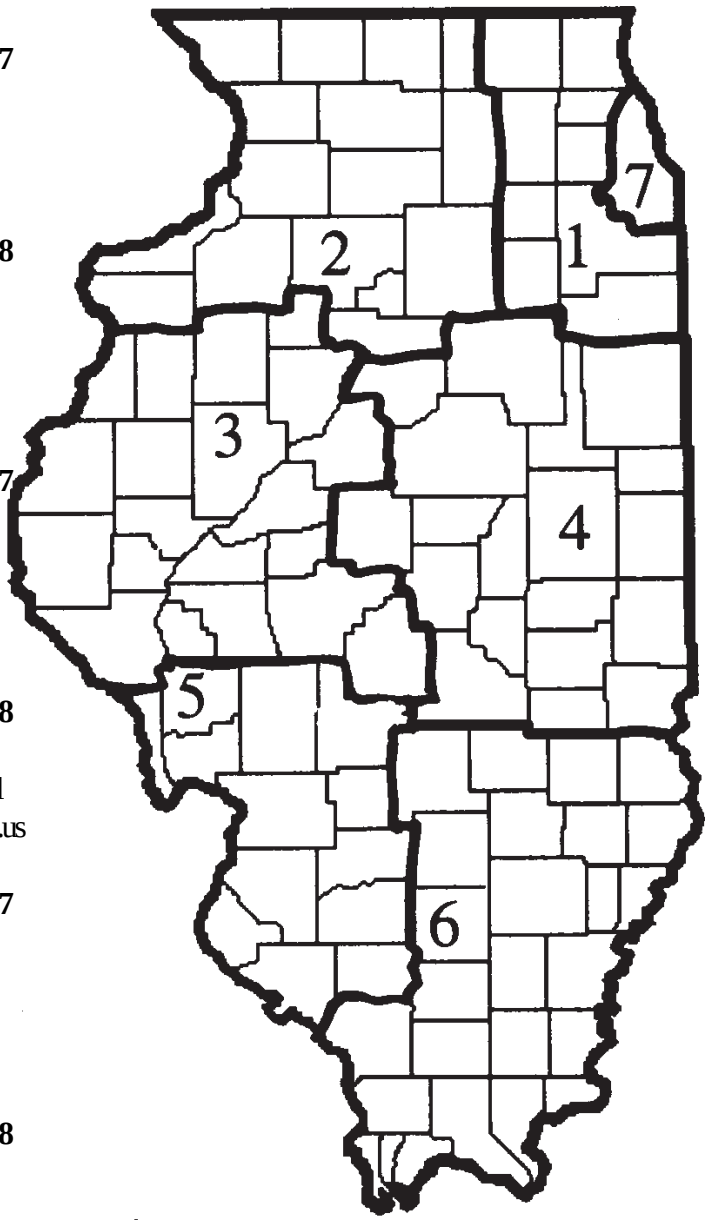

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sgolden@dps61.org

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Tom Foster
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Region 5 Director 05-07
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Region 6 Director 05-07
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Nancy B. Jefferson High School
jbhanchey@cps.k12.il.us

Region 7 Director 05-07
Denise Edelson
Hannah G. Solomon School
dnedelson@cps.k12.il.us

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

ISTA / ExxonMobil Outstanding Teacher of Science Awards Program

The Illinois Science Teachers Association with the generous support of ExxonMobil announces the 2006 - 2007 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, etc). 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 2006 – 2007 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, 2007 to:

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

Winners will be notified by April 15, 2007.
For more information contact Dr. Rockway at sher_rockway@comcast.net.

2006-2007 ISTA/ExxonMobil Outstanding Teacher of Science
Awards Application Form
Application Due Date March 1, 2007

ISTA Region:_____

Name:_____

Position (grade and subject taught):_____

School Name/Address:_____

_____

School Phone Number:_____

Email address:_____

Home Address:_____

_____

Home Phone Number:_____

I hold 2007 calendar year membership in ISTA: ————_____

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

Signed:_____ Date: _____
(Applicant)

Illinois Science Teachers Association
2006 Conference on Science Education
Peoria Civic Center & the Hotel Pere Marquette
November 2 – 4, 2006
Pre-Registration Form

Deadline for Early Bird Pre-Registration: Postmarked by October 2, 2006

Deadline for Advance Registration: Postmarked between October 3, 2006 and October 23, 2006

Registration on or after October 24, 2006: 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.

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

☐ Registration (limited to 40) $75 _____

Pre-Conference Field Trips for ☐ Elementary ☐ High School $20 _____

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

Please circle correct amount.

Registration Fees	**Earlybird** 10/02/06	**Advance** 10/23/06	**Full Rate** After 10/23
☐ 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

Thursday Reception in Exhibit Hall (4:00 to 6:00 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 $10.00 _____

Total Due: _____

* Please send all registrations in the same envelope.

Make checks payable to: Illinois Science Teachers Association. Send to Sherry Duncan, ISTA Registration, College of Education, University of Illinois, CRC #61, 51 Gerty Drive, Champaign, IL 61820. No one will be admitted to any part of the convention without registering. If your registration form is received by October 25th 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.

A Vision of Excellence: Building the Future through Science Education

Come to Peoria November 2nd, 3rd, and 4th for our annual conference! We are planning for a number of great sessions and other events. Our theme is focused on promoting excellence in science education in this state. Here's a sneak peak at some of the things we have in store for you:

- Our preconference on November 3rd will be "Mission to Mars." This is hands-on professional development for 5th through 8th grade teachers (others may be able to adapt materials to their grade level). It is presented by individuals from the NASA Specialized Center of Research and Training in Advanced Life Support. Activities include investigating plant growth, ecosystems, water and waste treatments, engineering, recycling, and food production. Teachers will receive the complete curriculum! Hurry and sign up as the workshop is limited to forty participants.
- Thursday evening we'll have the exhibit hall open. You won't want to miss this event! Talk to vendors, pick up freebies, network with fellow teachers, and win prizes!
- On Friday we have many fabulous sessions for you to attend. We have sessions for all grade levels and all subject areas within science. Some sessions are geared for new and preservice teachers. Veteran teachers are sure to find sessions as well.
- We also will have NSTA's Science Store at our conference for the first time. This popular feature held at the national conferences is sure to be a hit!
- On Friday night we are hosting a gala at the Lakeview Museum of Arts and Sciences. Come have dinner and drinks, browse through the galleries, shop at the gift shop, and dance to the Groove Daddies playing the hits we grew up with!
- On Saturday you'll have a choice of attending 50 minute sessions or 2 hour workshop style sessions. The day ends at noon. We hope you'll stay and attend this day as well.

What can you do?

- Register for the conference! The registration form is on our website at http://www.ista-il.org. Many science teachers and vendors have planned wonderful sessions for all. Let's support them as we all strive for excellence in science education. This is a wonderful professional development opportunity. Don't miss it!

http://www.ista-il.org/conference/index.htm

2006 Conference Schedule

(tentative)

Thursday, November 2

NASA Preconference Session for Middle School
Preconference Field Trips for Elementary and High School
Forest Park Nature Center: Do You Want to Step Outside and Say That!
Wildlife Prairie Park: Nature Walk and Tour
10 AM - 5PM: Lakeview Museum
4PM - 6PM: Exhibit Hall Preview and Reception
6PM: Observatory
6PM - 11PM: Lakeview Museum - Open House, Band, Laser Show

Friday, November 3

8AM: Opening Ceremony - ExxonMobil: Our Energy Future
9AM - 4PM: Conference Sessions - Pere Marquette/Civic Center
6:30 - 10:30: Gala - Pat McGinn (ExxonMobil), keyote speaker

Saturday, November 4

8AM: General Membership Meeting - continental breakfast and door prizes - Pere Marquette
9AM: Saturday Workshops and Conference Sessions

Pere Marquette Hotel

The 2006 ISTA conference hotel is the Pere Marquette Hotel in Peoria. The Thursday (November 2, 2006) pre-conference session will be held at the Pere Marquette, along with several conference breakout sessions on Friday and Saturday. Expect to meet friends and colleagues at one of the many social gathering spots on the premises. The Pere Marquette Hotel is a short walk to the Peoria Civic Center where the 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 Pere Marquette for conference attendees. Be sure to mention that you are registered for the Illinois Science Teachers Association conference in order to reserve at room at the special conference price:

Single $82.00 Double $82.00 Triple/Quad $108.00

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

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

Volunteers Needed!

Do you have some time to assist ISTA at the 2006 conference? We need volunteers to help at registration, moderate sessions, direct presenters and vendors, and much more. Please consider volunteering a couple of hours to help make the conference run smoothly. The conference co-chairs are Ray Dagenais (rjdag@imsa.edu) and Jill Carter (jcarter@pekinhigh.net).

Logistics	Ray Dagenais rjdag@imsa.edu
Vendors	Ray Dagenais rjdag@imsa.edu
Program	Jill Carter jcarter@pekinhigh.net
Registration	Coleen Martin cmartin@dunlapcusd.net
Off-Site Sessions	Jo Crow
Volunteers	Sherry Spurlock
Special Events	Julie Gianessi
Promotions	Kathy Costello Costello@htc.net

2006 ISTA Conference Vendors

500 Tours, Inc.
Ag in the Classroom / Illinois Farm Bureau
Amsco School Publications, Inc.
AIDEX
American Society for Clinical Laboratory Science-IL
Bedford, Freeman & Worth Publishing
Bio-Rad Laboratories
Carolina Biological Supply Company
CPO Science
Daigger (Sci-Ed Warehouse)
DCEO Office of Coal Development
Delta Education/FOSS
Eastern Illinois University
ECIA-The Educated Choice Insurance Agency
EduSuccess, Inc.
Environmental Education Association of Illinois
Explore Learning
Facilitating Coordination in Ag. Education
Fermi National Accelerator Lab Education
Fisher Science Education-Fisher Scientific
Flinn Scientific, Inc.
Frey Scientific
Glencoe/McGraw-Hill
Glen Oak Zoo-Peoria
Great Source Education Group
Harcourt School Publishers
Holt, Rinehart, & Winston
Houghton Mifflin
Illinois Association of Aggregate Producers
Illinois Association of Biology Teachers
Illinois Department of Natural Resources
IL Emergency Management Agency
It's About Time-Herff Jones
Kendall/Hunt Publishing Company
Lakeview Museum of Arts & Sciences
Lego Education (Pitsco)
MicroTech Microscope Sales and Service
Mid-America Earthquake Center-UIUC
Modern Biology, Inc.
National Energy Foundation
NASCO
Ohaus Corporation
Pasco Scientific
Perfection Learning
Pitsco Systems
PITTCON
Prentice Hall
Qwizdom, Inc.
Rigby & Steck Vaughn Publishing
SAE International (Foundation)
Safe-T Classroom Products
Science Kit and Boreal Laboratories
Scott Foresman (Pearson) Publishing
Texas Instruments
The Scope Shoppe, Inc.
UIUC Dept of Crop Sciences
UIUC College of Veterinary Medicine
Usborne Books
Vernier Software & Technology

Check out this

Sampling of Sessions

for our

2006 ISTA Conference

- Turning Trash into Useful Science Equipment
- Aware and Active in the Environment: Schoolyard Sleuthing
- Edible Geology
- Investigations in Environmental Science: A Case-based Approach to the Study of Environmental Systems
- Using Technology to Meet IEP Accommodations
- New Materials and Programs from the IDNR
- Creating Success in your K-12 Science Programs
- Inquiry through Squish the Fish
- Factors Affecting the Educational Success of Women Scientists
- Student Learning Practices in the Introductory Biology Lab
- mUSEum: Partnering with your Science Center, Museum, or Planetarium
- Build Illinois: 500 Million Years of Geologic History
- Our Changing Climate, Energy Resources, and Carbon Sequestration
- Lights! Camera! Action! Digital Analysis of Motion
- Digging into Paleontology
- Challenger Learning Center's New Micronaut Mission
- Benefits of Better Built Buffers: Trees, Water and Your Students
- How to Make Science Interesting to a Lower Level Student Through Forensics
- The Sciences of Veterinary Medicine
- Let's Go Fly a Kite: Inquiry Activities
- Science Fun for K-3 Students
- Who's Running the Lab? Classroom Management for Active Science Lessons

Illinois Science Teachers Association

2006 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@uiuc.edu), ISTA Membership, College of Education, 51 Gerty Drive, Champaign, IL 61820.

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.

Peggy Deichstetter is Recipient of 2005 Presidential Award for Excellence in Mathematics and Science Teaching

Peggy, shown with Arden L. Bement, Jr., Director of the National Science Foundation (left), and Dr. John Marburger, Director of The Office of Science and Technology Policy (right), displays her citation.

President George W. Bush honored science teacher Peggy Deichstetter, from St. Edward High School in Elgin, with the 2005 Presidential Award for Excellence in Mathematics and Science Teaching, the Nation's highest honor for teaching in these fields. Deichstetter was the only winner in Illinois and one of only 100 7th-12th grade teachers nationwide to receive the prestigious award.

In a citation given to Deichstetter, President Bush commended her "for embodying excellence in teaching, for devotion to the learning needs of the students, and for upholding the high standards that exemplify American education at its finest." As an Awardee, she received a $10,000 grant from the National Science Foundation (NSF), the independent federal agency that administers the awards program on behalf of the White House, and an all expenses-paid trip to Washington, DC for a week of celebratory events and professional development activities.

In a letter to Awardees, President Bush said "Math and science are critical components of America's technological and competitive strength. Through my American Competitiveness Initiative, my Administration is working to advance American innovation and support the efforts of teachers by increasing investments in research and development, promoting education in math and science, and encouraging entrepreneurship and technological advances."

Established by Congress in 1983, the annual presidential awards program identifies highly qualified mathematics and science teachers in all 50 states, the District of Columbia, Puerto Rico, the U.S. Territories, and the U.S. Department of Defense Schools. This year's recipients— recommended for the award by a panel of leading mathematicians, scientists, and educators are 7th-12th grade teachers. "These teachers exemplify what President Bush's American Competitiveness Initiative aims to achieve by raising the bar for math and science education for all students, who are our future leaders of innovation," said John H. Marburger, III, Director of The Office of Science and Technology Policy, Executive Office of the President.

Building a Presence for Science

Mary Lou Lipscomb
BaP State Coordinator, Illinois

Building a Presence for Science (BaP) is an electronic network initiated by the National Science Teachers Association to foster communication, collaboration and leadership among science educators. Through the network teachers 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 using the BaP web site www.nsta.org/bap to send email or by posting ideas or questions on the Illinois Message Board.

In Illinois, ISTA implements the BaP program and during the last several months changes have been made in the way BaP-Illinois is organized. In this new model, rather than having many small regions as was previously the case, BaP will now have seven regions corresponding to the current ISTA regional structure. Each of the seven regions will have two or more super key leaders who will work with the Illinois state coordinator and the key leaders in their region to provide regional opportunities for their key leaders and points of contact.

Currently the Super Key Leaders are:

Region 1: Susan Dahl, Tom Kearney and Anna Zuccarini
Region 2: Larry McPheron, Don Terasaki and Carol VanDeWall
Region 3: Coleen Martin and Randal Musch
Region 4: Susan Golden and Linda Shadwick
Region 5: Kathy Costello and Tom Foster
Region 6: John Giffin and Vicki Tripp
Region 7: Michael Lach and Chandra James for Chicago Public Schools
Denise Edelson and Brent Hanchey for Chicago Schools not part of CPS

Starting this fall members of the BaP network will start to receive a regular Illinois e-blast with information that has been compiled from a variety of sources instead of the multiple emails that you have been getting from me. As the state coordinator, I am the only person able to send information to the entire list. However, Kathy Costello and Linda Shadwick will be helping me to compile information and get it out to you in one "blast" on biweekly or monthly basis. If you have information about professional development opportunities that you would like to share with the BaP network, please send them to me (lipscomb@imsa.edu), Kathy (costello@htc.net), or Linda (l.shadwick@mchsi.com).

If you are currently a key leader or point of contact you are encouraged to go to the BaP web site, www.nsta.org/bap, to update your contact information. If you don't know your password, click the "Lost your password?" link. If your email address has changed since you became a member of the network you will need to contact me at lipscomb@imsa.edu. Include your full name and that you need your password in the body of the email message.

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. As a participant you will be seen as a communicator, leader and advocate for standards-based science education. You will have

access to a variety of information to share with colleagues, as well as opportunities to learn and grow both professionally and personally. As each school joins the network with a Point of Contact, BaP become a more powerful means of communication.

Does your school have a point of contact? If not, ISTA invites you to consider volunteering to serve as a point of contact for your school. You and your colleagues will become less isolated and benefit from the information shared within the network. A point of contact may be a classroom teacher or an administrator who is an advocate for science education and is willing to serve as a contact in his or her school building.

To volunteer to become a point of contact go to the Building a Presence web site at www.nsta.org/bap .

- Find the box that states "Become a Point of Contact" on the right side of the page.
- Select "Illinois" from the pull-down menu and then click "Submit."
- Enter your school's city and/or zip code and click "Submit."
- Click on your school's name from the list.
- Fill in all required information and click "Submit." If your school already has a PoC, his or her name will be listed as well as his or her key leader.

Are you interested in taking more of a leadership role in your school district, county or area of Illinois? If you are currently a point of contact and would like to become more actively involved in the Building a Presence for Science Program, consider stepping-up to key leader. To do so please contact me at lipscomb@imsa.edu and include the following information:

Your first and last name
Your e-mail address
The name and address of your school
The county in which your school (district) is located
Your current teaching assignment
A short paragraph indicating why you would like to become a Key Leader.

All members of BaP-Illinois network are invited to attend an awareness session at the ISTA Fall Science Education Conference in Peoria, November 2-4. Check the Conference Booklet for the time and place. The session will provide information about the recent changes in BaP-Illinois and an opportunity to network, face-to-face, with other members of the BaP electronic network. Hope to see you there!

BaP website: http://nsta.org.bap

Contact Mary Lou Lipscomb
email: lipscomb@imsa.edu
phone: 630-907-5892
mail: Illinois Mathematics and Science Academy
1500 W. Sullivan Road, Aurora, IL 60506

Will Your Pension Be There When You Need It?

Eileen Grasso

As active teachers, you are way too busy educating children to be involved in thoughts and discussions about your future pension and health benefits, right? I felt the same way during my thirty-three years of teaching. I remember thinking "Somebody's watching out for us. After all, it's the law, right?" Well, yes…and no! And people *are* watching, and fighting to keep our benefits, but your help is needed!

Underfunding the State Pensions—a Grand Tradition in Illinois

Our pensions and health care benefits *are* protected by law, but as we have seen, laws can be changed. The law says that the State should have paid $1,058 million into TRS (Teacher's Retirement System) during Fiscal Year 2006; instead it paid $531.8 million, a little over half of the obligation. With this money, and the money that is taken from your paychecks each month, and money that is provided by local school districts, TRS must pay pensions to retired teachers, their beneficiaries, and disabled teachers, as required by law. With more teachers retiring every year, and increased life expectancies, this income is not enough to pay the benefits. The TRS has been managing our money very well and generates income from investments that have been sufficient to make up the ever-widening gap that occurs because of the repeated failure of the legislature to adequately fund our pension system.

The most recent failure of the legislature was to fail to adhere to a law, which was put in place in 1995. This law provided for a stepped-up funding level that would have resulted in a healthy fund balance by 2045. Under the guise of "pension reform," the current legislature and the governor changed this law so that they can re-direct pension money to other projects—pet projects—otherwise known as pork. (In this election year, we are hearing about a lot of new state-wide projects, and you may be hearing about money coming into your area from the State, for certain pork—uh—projects). This re-direction of money has put a strain on TRS, which has been forced into a position of selling off more than $500 million of good income-producing investments, in order to meet current obligations. So, not only do we lose the income, but we lose income-producing capacity for the future.

How many years will it take for TRS to be unable to meet the obligations? The governor and his supporters say "Don't worry, be happy. This will not affect any current retirees, or even any current active educators." Does that make sense to you? If income-producing investment assets are ALREADY being sold in order to meet obligations, without these investments the gap will continue to widen. At some point, TRS will not be able to pay the bills. Do you have confidence that the State will be in better financial shape by then? In good enough shape to pay its obligations?

The law that guarantees your pensions and health insurance can be changed. If a Constitutional Convention is called in 2008, it would all be on the table. The final decision about whether public employees would have pensions, cost of living increases, and health insurance would then be made by a vote of the general public. In view of current events regarding employment, pension issues and health insurance nationwide, that sounds like a very scary idea.

Paying for Day-To-Day Costs of Government by "Taking" instead of Taxing

In 2003, a law was passed which allows the Director of the Budget to remove "excess" money from any state funds (a process called "sweeping"). This money is then transferred to the General Fund and used to pay the State's operating expenses, a cool way to raise money without raising taxes, some think! Consequently, in 2004, the State removed 4.5 million dollars from the Retired Teachers Health

Fund. This money was not "excess." It was to be used to pay current and future health claims, and would have been paid out within five years. This theft impacted all current and future retired teachers by causing an immediate drastic increase in our health care premiums as well as a big push toward "choosing" HMO coverage. In 2005, after a massive outcry, the legislature passed an amendment, which would protect the Health Fund from further "sweeps." Even though this amendment was vetoed by the Governor, an over-ride was passed, and for now, the Health fund is not subject to future sweeps. By the way, the 4.5 million dollars was never returned.

What You Can Do

Ask your legislators and candidates about where they stand on the process of funding current government by "sweeping" money from State funds. Funds that are swept include many regulatory funds that are designed to protect the consumer, as well as funds that protect natural resources. Even though the retired teachers health fund is currently protected from more sweeps, many funds that may be of interest to you are still being regularly decimated.

Ask your legislators and candidates where they stand on the issue of pension raids. Some will object to calling it a "raid," because they didn't actually take money from a pension fund. They just failed to put the money into the fund. The end result is the same.). Ask them why, if this is such a great plan, that Fitch Rating Service is considering lowering Illinois' credit rating because of this issue, and What effect will that have on the economy?

If they say "We are actually saving money by doing this," then ask them where is the money? (They are referring to the 6% cap on end of career salary hikes, and the projected savings from this have already been spent in this year's budget, even though the savings won't be "realized" for years.)

If they say… "This was supported by IEA, IFT, and so forth, and they must think it's in the best interest of their members…" remember that these organizations are mostly concerned about active teachers, not retired teachers, and they were able to preserve the ERO by supporting this legislation. Ask them why the pension raiding only affects suburban and downstate teachers. Ask them where is the fairness?

And finally, armed with the results of your questioning, go to the polls on voting day, and cast your vote accordingly.

If you are within five years of retirement, please consider joining the Illinois Retired Teachers Association, which continually fights for retired teachers, and is the only association in Illinois that is concerned solely with issues affecting retired public, private or college educators.

For More Information:

Teacher's Retirement System: http://www.trs.illinois.gov
State Universities Retirement System: http://www.surs.com
Illinois Retired Teachers Association: http://www.irtaonline.org
A description of Illinois pension funding: http://www.taxpayfedil.org/oct03.htm
Fairness Issue and Future Threats: http://www.saveourpensions.org

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Teacher - to - Teacher

Educators Share Information, Lessons, and Tips

Mary Lou Lipscomb
Illinois Mathematics and Science Academy

Teachers have a "bag of tricks" that they use on a regular basis or from time to time to spark or maintain interest, keep things moving, and/or help students understand a concept in a way that is unique or different. Sharing these activities or ideas with colleagues provides a professional development opportunity for everyone involved in the sharing.

In this issue three teachers have submitted an activity or lesson that they have used successfully at the beginning of the year to acclimate their students to rules and procedures in their schools or classrooms. Each has been used at specific grade levels, from elementary through high school, but I think 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 fourth teacher wants to let everyone know about an opportunity to learn more about the Antarctic this fall. A sincere "Thank You" to those who submitted their ideas and information for this issue.

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Getting to Know Your Students…
Linda Shadwick, a BaP super key leader and ISTA regional director in Region 4 and a former chemistry teacher at Villa Grove High School in Villa Grove, shares her method for learning about her students and keeping their information organized. Linda writes, "I used the (following) student information sheet on the first day of class while I passed out textbooks to students. [They] usually had all of this information with them on the first day. I then read over these sheets and made a file folder for each student.

"This information sheet became the first paper in the file folder. I then added completed work for each student as the year progressed. If I needed to find the student, talk to his/her parent or just get a better idea of what the student thought about science and how his knowledge was changing, I had the information available without going to the office or counselor's office."

She goes on to say, "I changed the demo (the last part of the info sheet) from year to year, but a favorite was to use a tall un-graduated cylinder filled with cold lemon-lime soda and then drop raisins into the soda. The raisins drop to the bottom of the liquid, collect the carbon dioxide, decrease in density, rise to the top, release the gas, increase in density and drop down through the soda again, repeating the process. We could then discuss density, a concept with which most students have a real problem."

Follow the "Rules"…
Kevin Wilmot a POC and fourth grade teacher at Wm. Harris School in Decatur writes, "I was teaching sixth grade the last two years…[and] I had some problems with students thinking that science activity time was goof-off time." He goes on to say that many students were also very self-conscious about their

results to the point that the teams often reported the same inaccurate results in an effort to not be "wrong". So, he typed up his expectations along with the reasons that they were important. Kevin then and handed them to each student and discussed the expectations with them before starting the first activity of the year.

Here are Kevin's procedures for science activities:

- Science activities require your undivided attention. At times we will handle items that are dangerous or expensive to replace. It is not a time to act silly or skip directions.

- Pay attention to directions. If you are supposed to wear safety goggles, wear them. If you are asked to measure an ingredient, measure it as accurately as possible. Sometimes the amount of a substance used determines whether the activity "works" or not.

- Encourage your team or partner to follow directions carefully. If someone does not understand their part, explain it again or ask the teacher's assistance. One person doing the wrong thing could make the activity dangerous or ruin the results. Everyone needs to participate fully.

- Write down predictions. Make drawings or sketches to show what it looked like. If you are asked to make measurements, counts, or write down times or colors, write them down with labels so that you know what happened, or can compare results.

- If you get different results than others, do not change yours. Try to figure out why yours are different. You may have done something a little differently from others and you may be the one who did it correctly.

- We can learn from all results. Observing carefully and making clear notes is the key to learning from science activities.

- Don't expect someone else to know what to do. Read and listen carefully so you will be sure about what you are doing.

After implementing the procedures Kevin says, "My students suddenly were acting the way I wanted them to at science activity time!" He continued to remind them of the procedures before each next 3 or 4 activities and occasionally referred back to the expectations if students were straying from procedures. He concludes, "Our activity time has been much more profitable since implementing these science activity procedures."

Use Your "Brain"…

Debbie Catron, a point of contact for Garfield Elementary School in Danville, has suggested the following activity for use in grades 3 through 5. Debbie currently teaches a split 4/5 class (all subjects). She writes, "I borrowed this idea from a workshop I attended several years ago. At the beginning of the year, we discuss the brain, particularly the cerebral cortex, limbic system and the brain stem." Debby goes on to say that the students make a paper model of the brain and then color it. The cerebral cortex is green for "go" (that's the part for learning—an important part to use at school); the limbic system is colored yellow for "caution" (it is the gatekeeper of emotions both positive and negative—we have to be careful what we say and do); and the brain stem is red for "stop" (this part of the brain doesn't have to do with learning or emotions). Debby uses this model to discuss the necessity of procedures in the

school, no put downs, no bullying, etc. She says that it is a good way to get classroom and school procedures in place and it helps the students understand why they need to have the procedures and treat each other with respect.

Learn what teachers are doing in Antarctica…

Betty Tummel, a point of contact and teacher at Husmann School in Crystal Lake, wants to let everyone know about her upcoming trip to Antarctica and hopes you and your students will be able to join her electronically. Betty will be participating in the ANDRILL Research Immersion for Science Educators (ARISE) program. She will be leaving in October to spend two months participating in a multidisciplinary, multinational geological drilling program and helping to develop and eventually implement innovative education and public outreach projects. The goals of the project are to raise public awareness of Antarctic scientific drilling and integrate polar geoscience content into a range of learning environments. During the time that Betty and the other educators from around the world are in Antarctica you and your students will be able to get daily information on the research they are doing.

You can learn more about the ARISE project at the ANDRILL website www.andrill.org or attend a presentation by Louise Huffmann, a previous ARISE participant at the ISTA Fall Conference. You may also contact Betty at TrummelANDRIL@aol.com.

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If you have lab or classroom management hints, great websites you have used, science activities, lessons, or demonstrations that you have found to be effective with your students, please send them to me electronically at lipscomb@imsa.edu, fax them to 630-907-5893, or mail them to me at 1500 West Sullivan Road, Aurora, IL 60506-1000.

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 sjduncan@uiuc.edu.

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

STUDENT INFORMATION SHEET

NAME: _____
ADDRESS: _____
E-mail ADDRESS: _____
PHONE NUMBER: _____
AGE: _____ BIRTHDATE: _____
PARENTS'/GUARDIANS' NAMES AND ADDRESSES

1. _____
2. _____

NAMES **AND AGES** OF BROTHERS AND SISTERS

1. _____
2. _____
3. _____
4. _____
5. _____

- Do you have Internet access at home? _____ at the library? _____
- If you were to choose your lifetime career, what would be your top 2 choices?
  1. _____
  2. _____
- Do you plan to further your education after high school? _____
  If so, what school(s) might you attend?
  _____
- What math class did you take last year?_____
- What math class are you taking this year? _____
- What areas of science do you like BEST?
  _____
  _____
- What areas of science do you like LEAST?
  _____
  _____
- Is there any information about you that I should know in order to help you do your best in this class? _____ If so, what is this information?
  _____
  _____

Please list below your class schedule for the year by period, class name and room number.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

When you are finished with this sheet up to this point, sit quietly until everyone is finished and then your teacher will complete a demonstration on the front desk. Observe the demonstration. Complete the following based on the demonstration.

List 2 accurate, precise observations of the starting materials.

a. _____
b. _____

List 2 accurate, precise observations of the reaction.

a. _____
b. _____

List 2 precise hypotheses as to why this reaction occurred.

a. _____
b. _____

Articles

Play Ball! NCLB Science Accountability

Richard A. NeSmith
Eastern Illinois University

Has your department, school, and district discussed how the state department will determine the baseline measures and evaluate the assessment of science in the AYP?

Spring Training

Spring training is a sports term used in professional baseball as a period of time where players return to practice over and over the fundamentals of the game in order to prepare for the "regular" season. The dogged days of summer have been well upon us and many are looking forward to some relief from the scorching heat. The *boys of summer*, as the ball players are affectionately called, start practice off playing a little *pepper* (a hand-eye coordination exercise that can become quite intense) and talking up their World Series hopes. *Go, Team, Go!* With the Whitesox in their recent glory, the ready and steady high-flying Cardinals, and then there is Dusty's desirous and dynamic attempt to reconstruct the Cubs. We really have much to appreciate about baseball in Illinois. As we approach the playoffs some of you still have hopes of winning another pennant.

"Rah, rah ree … kick 'em in the knee. Rah, rah, rass … kick 'em in the *other* knee!" Oh, that's soccer, isn't it? Clichés are spiffy and can sometimes rally the troops. Presidents have used them. Principals and teachers have incorporated them. Even Fortune 500 companies have made the most of clichés to provide vital impetus and momentum which propels to new heights. Clichés, however, in and of themselves, do little in the way of providing actual applications for change. They can actually become impediments to progress when they are used to simply bury or hide the real issues, rather than leading to action (NeSmith, 2006a). What we need are not spin-doctors or public relations experts, but basic planning for *results* (Erickson, 2006). With the *No Child Left Behind* mandate to include science tests scores in the Adequate Yearly Progress (AYP) reports, it is time to *play ball*.

As we begin another school year, having taken a bit of rest and relaxation, we must consider what the future holds. August is upon us, but with the new school year comes a "clean slate." Teachers are already implementing those new lesson plans, activities, and (NCLB) requirements. Increasing student learning and achievement are on the hearts and minds of all teachers. Middle level educators are seriously contemplating possibilities to improve middle level education (Erickson, 2006; NeSmith, 2006b). Science teachers, in particular, will have the NCLB spotlight of scrutiny shining directly into their eyes and on their work. May our response not be the deer in the headlights look. This requires that we *plan* and *implement* measures in order to: 1) establish a baseline for comparison [not *just* the

National Assessment of Education Progress (NAEP)], 2) establish a means of pre- and post-testing/assessment so as to establish and recognize *actual* content strengths and weaknesses, and finally, 3) incorporate research-based strategies and methods to facilitate student learning and achievement.

Maybe the question to pose is, "Has your department, school, and district discussed how the state department will determine the baseline measures and evaluate the assessment of science in the AYP?" Has the school sought to identify how the State will ascertain and determine the baseline for assessing student achievement and teacher accountability? Rigorous examination and analysis, here, will go a long way in preventing serious mishaps and hardships during the next seven years. To only use one means of assessment is to create a table with one leg. And, to simply arbitrarily choose a number because it seems to be a good baseline would be a grave error. What is decided here will have great influence right on up until 2012.

The Strike Zone

In baseball, a battle of wit and stamina occurs during every single game between the pitcher and the batter, who are separated by sixty and one-half feet of air. A battle is also taking place between the pitcher and the umpire and the batter and the umpire…for the umpire determines, in practice, where the strike zone exists. Some umpires have large strike zones while others have smaller ones. Strike zones are pre-defined but often with a large measure of umpire "subjectivity." The strike zone provides the *baseline* for both the hitter and the pitcher, for both must acclimate to the umpire's interpretation of it. In baseball, chalk baselines are also established to guide where the runner is to travel upon hitting the ball. There is a progression and a sequence and one cannot skip any "bases." Obviously, bases and baselines are very important in the sport of baseball. Even the NCLB "program," a massive 670-page law, (though not evidence-based but testing-centered), recognizes the need for establishing baselines. How will your school and your district utilize these baselines to ascertain and implement strategies for the improvement of science achievement? Have the science teachers talked

Science teachers will have the NCLB spotlight of scrutiny shining directly into their eyes and on their work.

about this matter? The establishing of a baseline, called *baseline model of practice*, is vital for it will be the only means to providing a valid assessment for future analysis (*Stepping Up*, 2005). The establishing of a valid baseline will facilitate selection of future treatment and controls, determine whether the teacher, school, or district, are, indeed, *progressively improving*, or whether they just think they are. Or, worse, media assumptions and ill-informed reporting that makes accusations that you are not progressing, when in fact you are. Teachers need to realize that the United States Department of Education equates achievement with higher tests scores, and higher tests are equated with "good" teaching.

> Every student should make substantial academic progress every year in every class. Good [*sic*] instruction will ensure that they meet this goal (*The Facts About*, 2005).

Short-sightedness in preparing the baseline has come back to haunt many states, for poorly established baselines now stand to judge their effectiveness in the educating of their students. Chambless and Holland (1998) explained the importance of establishing baselines in, *Defining empirically supported therapies*, as follows:

> To be able to demonstrate that a treatment has changed a target behavior, single-case

> experimenters first need to establish a baseline for that behavior over a period of time. The baseline serves as the comparison condition that controls for the effects of assessment and the passage of time and that, depending on the nature of the baseline (no intervention vs. control intervention), may control for expectancy, attention, and the like. Often, during baseline, improvement due to one or more of these factors will be noted. The investigator should implement the treatment of interest only once the baseline of the behavior targeted for change is stable or indicates deterioration for at least the three assessment points necessary to establish a linear trend. If the behavior examined is variable (e.g., a client with considerable daily fluctuations in severity of depressed mood), longer baselines are needed to establish the pattern of the data before proceeding (12).

It is important to understand that the establishing of baselines is not the same as the setting of goals. Goals are aspirations whereas baselines are data-established averages. The establishment of baselines requires data collection. To simply utilize one source, such as the NAEP, is insufficient. First of all, the NAEP has limitations, one of which is that it is restricted by assessing only students in grades 4, 8, and 12. Numerous types of assessment are needed in order to *triangulate* the data, thus providing a more accurate, valid, reliable and, yet, rigorous baseline for future use. *The ABC's of "AYP"* (2004) specifies a five-step process for preparing states, schools and students for AYP. These include:

1. States determining what all students should know and be able to do.
2. States calculating the starting point for AYP.
3. States setting specific targets to measure whether all groups of students are making Adequate Yearly Progress in language arts and math [*and, in 2007, science*].
4. States measuring the performance of students and schools.
5. Steps are established to implement a strategy to help students in schools that do *not* make AYP (pp. 1-9).

Since this phase of determining AYP for science achievement by the State is crucial in the NCLB plan and program, it is highly desirable that teachers and science educators become involved in the process, as well as being briefed in the collaborative discussions needed to determine realistic expectations.

The Batting Cages

The best hitters in baseball tend to be those who study hitting and put in many hours in the batting cage. It is here that they repeat what they have learned until it becomes second nature. They have coaches, who are also students of hitting, assess them and provide important feedback on such concepts as stance, swing, and even head positioning. They practice the fundamentals, self-assess (view themselves on video), and seek to establish proper and "proven" mechanics of hitting. Those who go into hitting slumps re-evaluate and try to re-establish the form they had prior to such slumps. In education, pre-test and post-test seem to be out of vogue but some means of credible measurement is vital. Not only do teachers need to know where the students are academically, the students themselves need to know. The team effort is to move from home plate to first base. That requires player participation, first base coaches, and a manager in the dugout, not to mention the statisticians, technicians, and so forth, all of which join together to help the team succeed. *IF* we are going to approach education from a standards-based practice, then we need to evaluate those standards and then, as a team (grade-level or subject-level) map out the curriculum to be assured that the

standards are being addressed…and to delete the unplanned redundancy and repair the gaps in the curriculum.

If standards are to be in the forefront, then we need to make certain, as teachers and educators, that *our assessment is actually measuring our standards*. We cannot stress *thinking skills* for example, and then assess for rote memorized facts. We cannot motivate faculty to teach higher order thinking skills only to test for knowledge and comprehension. There seems to be a dichotomous argument among educators and the general public, alike, that education is based on an either/or philosophy and practice. Either we are rigorous in our academics or we are slack. This educator has argued for greater emphases on becoming *learning-centered* as opposed to *standards-centered* only to have some read this to suggest a lax curriculum. That is not what is being proposed…but rather to have both, rigor and learning at the forefront; facts and concepts; some memory work and some thinking skills. Few would hold that learning is limited to rote memorization. Neither would most hold that learning is limited to being able to analyze, synthesize, or evaluation without having a base knowledge on which to base one's thinking. Both are vital. Both are important. Both are needed if we are going to produce balanced individuals who become life-long learners. Learning can no longer be defined as a "change in behavior," as has been the learning behavioral model which proposed a stimulus-response or cause-effect explanation (Clark, 2004; Smith, 2003). Learning, more precisely, is a change in the neuronal connections in the brain (Edeline, 1999; Schultz, Schultz, Tremblay and Hollerman, 2003). Learning is far more a dynamic process. This should influence the types of assessment we procure, the data we record, and our academic definition for success. Standards are important but they should be only a component of the program; not the entire program. Otherwise, the standards become the umpires as opposed to the umpires utilizing the standards to evaluate the success of the players. If we move to a learning-centered approach rather than simply a "standard-centered" approach, then when the standards change we need not reinvent the wheel (which we have become very good at).

If standards are to be in the forefront, then we need to make certain that our assessment is actually measuring our standards.

Ball Practice

Unlike the adage, practice does *not* make perfect. Practice does, however, make permanent. Successful teams have productive practices. They not only study the fundamentals, memorize pitchers' styles and strategies, but they *apply* this information on a daily basis. Perfection is not a realistic expectation. To say that I expect every one of my students to make an "A" in my course is not very realistic. Or, to say that every single student in one's class will make a perfect score on an essay question is not only unrealistic but is setting the teacher and students up for failure. No batter expects to bat 1.000 in any season, or month, or week, even. In fact, the *superstars* become superstars by batting just over .300! That is only three hits out of ten at-bats. Pitchers do not become superstars just from pitching perfect games, no-hitters, or even shut-outs. Rather, they just plug along one game at a time and one season after the next…and as they hone their skills they become more valuable to the team. One day they are then referred to as one of the "great" players of the game. Our students should be motivated, and expected, to achieve…but they need to do more than just memorize the rule book, analyze the pitches, and study the fundamentals of hitting. They need to have a multitude of opportunities to practice; to apply what they are learning and have learned. Application is so vital. How is application handled in the standards? How does one assess the application of knowledge? Is it as vital as memorized facts? Is it less vital than being

able to spit back what a textbook has in black and white?

Many of you will remember the earlier studies regarding the characteristics of effective teachers (Clowes, 2002; Rosenshine, 1997; Rosenshine & Stephens, 1986). Most of the findings revealed a commonality between effective teachers; such teachers provide their students with practice, practice, and more practice, this included independent practice and guided practice. In short, practice is simply the application of what has been learned. How does the science standards suggest application be assessed? Practice enables the brain to organize, reorganize, assimilate, accommodate, and to strengthen conceptual understanding by actually producing additional neuronal connections, as well as the myelination of already pre-established neuronal connections. Such permits the retrieval of encoded memory to be more easily accessible to the learner. In essence, the more "access points" provided for the brain the more easily the concepts can be retrieved. How does this, or should this, be viewed in your AYP?

The Season

As you read this, sports fans are all probably more attuned to who should be playoff contenders, or even the World Series, by now. In education, however, we are always in extra innings. The game is never over and to win simply means to stay out in front. Education has no ending. We want our students to become life-long learners. This means that we need to constantly be updating our methods, strategies, and our goals. We want to see progress over the previous season and we want to aim to improve next season. We need to examine pertinent research, make applications to improve student achievement, as well as provide ample evidence that we truly are progressing. The only way to set the record straight is to provide properly formed baselines that actually indicate where our students are, and then set appropriate goals on where we want them to be at the end of the "season."

As we hoop and holler, rant and rave, or cheer and yell out the clichés, let us remember that winning is a matter of establishing proper baselines, examining our swing *before* and *after* the season, and finally, incorporating the latest applications that have shown themselves to be research-based, effective, and applicable to improving student learning and student achievement. Let us be rigorous but practical, precise but accommodating, and consider the whole child. May we reflect and prepare for the future of our students and for the newest addition to the Adequate Yearly Progress, especially for those of us teaching science!

In the winter issue we will look at specific research-based applications for improving of classroom instruction and student learning. In the mean time…" "Go, Team! And, someone pass the popcorn." ☺ Carry on!

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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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"All Preedichin's Arnt All Riet:" Looking at Young Children's Foresight-Related Behavior

Jean Paine Mendoza
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In inquiry-oriented classrooms, teachers tend to be concerned not so much with transmission of facts as with anticipation, conjecture, or foresight

Some literature, of early childhood education, gifted education, and "best practice," views foresight-related activities such as estimating, hypothesizing, and making predictions as appropriately challenging for children. Learning standards developed by national science and math organizations as well as the Illinois State Board of Education include benchmarks for such behaviors. It appears, however, that little analysis has been done of ways young children engage in estimation, prediction, and hypothesis formation in classrooms. Drawing upon anecdotes from a classroom where I was part of the teaching team, I will examine what can take place when teachers engage children in considering possibilities, or what Bruner has called the *subjunctive mode*.

The anecdotes below were collected in a kindergarten-first grade classroom in a university-affiliated early childhood gifted education program in Illinois. Facilitating small-group math instruction was one of my duties there as a graduate assistant. The school's curriculum incorporated the Project Approach, which emphasizes *engaging children's minds* (Katz & Chard 1991) through first-hand investigations of topics worthy of their attention and energy.

Anecdotal Reports: Estimating with Matteo, Emma, Danica, and Jolie

During small-group math instruction, I presented a bin of orange wooden (Cuisenaire) rods to five kindergarten-age children at the math table. At the time, the entire class was involved in a Project Approach study of "Who Measures What in Our Neighborhood?" The purpose of the rod activity was to provide experience in using non-standard linear measurement. The children spontaneously began to make structures with the rods before I explained the task.

Matteo Responds

Teacher: Today our job is to use rods to measure. How many do you suppose it will take to go from one end of this table to the other? What would you predict? Anyone have an estimate?
Matteo: *(frowning slightly)* Why can't we just measure it?
T: We're going to practice estimating or predicting, before we measure.
M: *(looking out the window)* I don't know.
T: I can get back to you.
The other children respond in turn (see below). Matteo goes to the drinking fountain while the others have their turns. When he returns, it is his turn again.
M: (to teacher) Do you know the answer?
T: No, I haven't done this yet.
M: What do *you* think it is?

T: I always go last, remember? Are you ready to tell us your idea?
At that point, a situation across the room requires my intervention. I leave the table briefly to handle the disturbance. When I glance back at the math table, Matteo is kneeling on the floor beside his chair, surreptitiously moving a rod along the underside of the table and counting under his breath. He does not seem to notice that I have seen him. He slides back into his seat when I return.
M: *(frowning, looking away)* I still don't know how long.
T: That's okay. Estimating is for when we don't know yet. We estimate first, remember, then we measure.
M: *(huge release of breath)* I can't.
T: We'll go ahead and measure then.
Matteo's classmates grab rods and begin to set them end to end along the table. Visibly relieved, he joins them.

Emma Responds

When asked for her estimate of the length of the table in orange rods, Emma smiles cheerfully and does not look at either the table or the rods.
Emma: One hundred!
T: One hundred rods? What made you decide its one hundred rods?
E: I just think it is!

Danica and Jolie Respond

In response to my request that she estimate how many rods long the tabletop is, Danica holds a rod, looks at it, then scans the length of the table with her eyes.
Danica: Thirty. It looks like thirty.
Teacher: You looked at it, and you saw it's about thirty rods long?
D: Yes. I was looking at it.
Jolie: *(smiling)* Me, too. What Danica said.
T: How did you decide you agree with Danica, Jolie?
J: *(looks at Danica, who is still holding a rod)* I just like her idea.

An Analytical Look at Estimation with Matteo, Emma, Danica and Jolie

Asking the children to estimate the table length, to predict how many rods they will need, before actually measuring invited them to go beyond exploration and to have a stake in the outcome of their investigation. What relationships would they find between their guesses and the actual measurement? They had something to anticipate, to compare. Asking them to explain how they arrived at their answers afforded a look at their metacognition—their knowledge about what they knew.

Danica's response appeared "logical," much like what an adult would do. She did not answer immediately, but held a rod while concentrating her gaze on the tabletop, giving the impression that she could picture those rods on the table (perhaps as long as she had the concrete object in hand). Her statement, "It looks like thirty will fit," indicated that she was aware of and could articulate to some extent how she arrived at her answer. (In fact, her estimate of thirty rods was close to the actual length.) Her behavior indicated experience with linear measurement and number concepts that were sufficiently developed for her to imagine possibilities in the context. She could begin to justify her estimate. Danica gave the impression of being task-focused. She did not show any strong affect such as discomfort or excitement, but seemed interested in all phases of the activity.

Emma, on the other hand, gave her estimate with enthusiasm, but without examining either the rods or the tabletop. As Toulmin says, "Prediction is all very well, but we must make sense of what we predict" (1961, p. 115). Emma's explanation, "I just think it is [one hundred rods long]," suggests that she had not made sense by means of creating for herself a mental image of one hundred rods on the tabletop. Emma showed no signs of distress and enthusiastically participated when it came time to lay the rods end-to-end. Her guess was wide of the mark, but feedback from actual measurement would help her make sense of what she and her classmates predicted. I could have, and perhaps should have, later helped the children count and measure with one hundred rods,

validating Emma's contribution by finding out what "one hundred rods long" actually looked like. Her demeanor seemed to imply, "I'm not sure what this is all about but, okay, I'll play."

It seems significant that some weeks later, Emma, commenting on what she had learned during the class project, "Who Measures What in Our Neighborhood?" said with considerable pleasure and pride, "I didn't know what measurement was or even how to measure. I didn't know anything about measurement until this class." Besides demonstrating the kind of metacognitive growth teachers' hope for, Emma's comments confirmed my assumption that she had lacked the knowledge and experience to seriously consider how many orange rods would go the length of the table.

Jolie chose the same estimate as Danica. Unlike Danica, whom Jolie considered her "best friend," Jolie did not focus attention on the rods or the tabletop until the estimation task was over and they could measure. If her response was based on cognitive effort similar to Danica's, that was not apparent in her actions or her justification statement. Was she able to predict, but motivated socially to show solidarity with her friend? Did she, like Emma, lack the experience, skills, or developmental level to make her own prediction? Justifying her answer by saying "I like [Danica's] idea" reinforced the impression that she needed or elected to rely on her friend's prediction. This was by no means the first or last time a teacher of young children might see a student deliberately give the same answer as a friend. Some children have refused to make a prediction or estimate until the friend has done so. Is the implication purely social—is the child declaring, "I want to be like my friend?" Or perhaps "borrowing" a friend's perceived expertise is a safe approach to an unfamiliar problem.

Unlike the other participants in the rod activity, Matteo indicated discomfort – even anxiety and frustration — through facial expressions and body language. He appeared to avoid making an estimate. He answered my questions with questions of his own. Finally, his attempt to measure under the table thwarted, he blurted out, "I can't." He apparently knew how to find the actual length of the table with the rod. Yet he would not make a carefully considered guess, a wild guess, or an imitative guess.

Matteo's teachers consistently took care to emphasize learning goals over performance goals, which is likely to reduce children's sense that they must "be right." Still, Matteo's distress over being asked to make an estimate was evident. In metacognitive terms, he knew that he did not know the exact answer. He wanted it, though, and knew how to find it. If the teacher wouldn't tell him, he would get it when she wasn't looking! His strategy could be construed as a form of cheating, but actually showed some cognitive sophistication.

Thoughts on Children's Inquiry and Conjecture

In inquiry-oriented classrooms, teachers tend to be concerned not so much with transmission of facts as with *anticipation* (Dewey 1934, p. 69), *conjecture* (Katz 1995, p. 5), or *foresight* (Toulmin 1961)—the mindset of possibility, hypothesis, and contingency. Investigative work in science and mathematics necessarily involves guesswork. Investigators consider what might happen in a situation, and curiosity about potential outcomes leads them to try a new idea, to retest the familiar, to consider possibilities, and to select what Toulmin calls a suitable *forecast*.

Whether problem solving or experimenting, one cannot guarantee that the selected alternative will, in fact, be viable. Thus the teacher who values children's inquiry faces the challenge of acquainting them with the fundamental nature of the subjunctive mode. That is: predictions, estimates and hypotheses are uncertain, temporary, and expendable. Unlike *facts*, which have comforting if illusory certainty, even one's best guesses must be tested and discarded or reshaped to fit new knowledge. Children may not immediately understand that some of their initial ideas are meant to be deconstructed and remade as they learn more about a topic. Yet, as another classroom anecdote suggests, they may be capable of doing so.

Six-year-old Dakin, a classmate of the four children who faced the rod task, distilled his experience with foresight-related activity to its essence in five words. Asked to write what he learned during the project, "Who Measures What

in Our Neighborhood," Dakin responded, "I learned all preedichin's arnt all riet."

"All predictions aren't all right." Of the many experiences Dakin had during the three month project, he chose that to share. He apparently had begun to recognize that as an investigator he must be willing to change his thinking, reorganize his ideas, restructure his knowledge. Dakin expressed at a basic level what Csikszentmihalyi (1996) found among exceptionally creative people: that flexibility and resilience are necessary for "flow," that "constant shifting from action to reflection, from passion to objectivity" (p. 316) which allows the mind to create and discover.

To anticipate—to predict, hypothesize, estimate—the young child must be able to imagine a situation, and without benefit of the concrete activity upon which she often depends, think about how it can be altered, resolved, or measured. The ability to mentally represent things-not-present seems to be central, and the child's thinking must be flexible enough that his or her misconceptions or preconceptions serve as the basis for new experience and the restructuring of knowledge.

Jean Piaget, Eliot Eisner, and others have asserted that the separation of cognition and affect is artificial. There is no intellectual activity without some degree of emotion, nor affect without cognitive elements. Teachers in inquiry-based classrooms want children to stretch cognitively and affectively, to think and act beyond the familiar in order to meet the tasks of inquiry. But where there is uncertainty, there is likely to be a perception of risk: who knows what might happen? Perhaps something bad; one must proceed with caution. When a teacher asks children to anticipate, to look ahead, it may be perceived by some children as an invitation to take part in intellectual and emotional risky business, ushering them into territory where their perspectives, processes, and products are exposed to public scrutiny. Accepting the demise of a hypothesis can be hard even for adult researchers; hence the occasional scandal of "salted" archaeological digs, falsified data, or plagiarism. It should be no surprise then that a child might resort to his own under-the-table activity in a struggle to avoid having a wrong idea exposed! Clearly, creating optimal classroom environments for exercising foresight will entail sensitivity both to children's cognitive activity and to their affective characteristics.

The teacher who values children's inquiry faces the challenge of acquainting them with the fundamental nature of the subjunctive mode.

Questions, Toward Greater Understanding

When inviting children to conjecture and anticipate, it is evident that one can expect varying responses not only from child to child, but also within individuals over time. Further research is needed into the ways children approach foresight-related tasks and construct understandings of what to do when they find errors in their own thinking. What might be some barriers to children's effective predictions, estimations, hypotheses? By what paths do they come to understand and accept uncertainty as potentially desirable? If there is a developmental sequence in children's prediction-making, what is it? What might interfere? How can we approach best practice in engaging children in foresight-related behaviors?

Implications for Practice

Given the wide variation in cognitive and affective factors influencing young children, teachers who value inquiry face significant challenges if they want to give prediction, estimation, and hypothesizing significant roles in their classrooms. Children need time and many

There is no intellectual activity without some degree of emotion, nor affect without cognitive elements.

opportunities to practice, to gain the experience, and to construct the knowledge necessary for making effective predictions, estimates, and hypotheses. *Practice* in this case does not mean *drill*. A child like Danica, already experienced and confident about her thinking, can benefit from encouragement to further reflect aloud on her process. If a child's idea seems farfetched or random, as Emma's did, more concrete experience with similar materials or activities can build knowledge he or she can apply to similar tasks later on. More encounters with measurement and estimation might also help Jolie, who borrowed her friend's guess about table length, to become comfortable formulating her own ideas. It seems likely that for children like Matteo, who become tense during foresight-related tasks, a teacher's modeling of the courage to express potentially wrong ideas could be helpful: "My guess didn't work out. I'll make a note of what happened. What shall I try next?"

Such children do not benefit from scolding when their face-saving strategies resemble cheating. Teachers can handle such issues in ways that help the whole class. In the K-1 classroom discussed here, when an activity challenged children to the point of distress and frustration, teachers often opened discussion with the class regarding "what was especially hard" about it. Matteo, for example, might have benefited from a private conversation about what he found difficult about the rod estimation task. His concern might also have been raised in a general way during a class meeting: "We have been estimating this or that. Some people have said they think it's hard. What are some things that are hard about making estimates?" The group should also discuss positive aspects of the same activities. Children who shared Matteo's reluctance to make forays into foresight would then have opportunities to hear peers such as Dakin reflecting on how they met similar challenges, perhaps beginning to deconstruct their own anxiety over not being right. Teachers might also defuse tension by inviting an anxious child to "be wrong:" "Would you tell us what you think *isn't*? What do you think *won't* happen?"

Teachers invite children into foresight-related activities, anticipating that they will move toward strengthened capacity and disposition to predict, to estimate and to hypothesize; and toward greater ability to reflect upon and articulate what they think. Perhaps the most important goal of such invitations is to have children eventually — like many a scientist, mathematician, or other creative spirit – accept and even embrace six-year-old Dakin's discovery: the maxim that "predictions aren't always right."

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Start the Year Safely

Judith A. Scheppler

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As we all begin the busy new school year, it is important to address the topic of laboratory safety and to begin with clear expectations for all. Laboratory safety is a vital issue that involves everyone - parents, students, teachers, and administrators; requires resources – time, equipment, and supplies; and is an on-going process. Everyone wants to work safely in the science laboratory with students; no one would knowingly or willingly put students or themselves at risk. When Ray Dagenais and I took the cover photographs this summer, of some E2K+ teachers working in one of IMSA's laboratories, we framed each shot with an eye toward the safety features found in the laboratory. As you read through this article, refer back to the photographs and see if you can identify the safety items present in each.

Before the Year Begins – Audits, Training, Contracts

Before beginning a year of laboratories with students, make sure that all safety equipment is present and functioning properly and that personnel know their responsibilities and are trained in laboratory safety. Some safety equipment and materials commonly found in the lab are listed in table 1. If you carefully examine the cover photos and photo in this article, you should be able to find many of these items. Having the items present, and making sure that they are stocked and in good working order, however, are two different things. For example, a routine safety audit may show that an eyewash or shower, while present, is no longer functioning as it should. Showers should be tested at least once each year and it is recommended that eyewash stations be flushed for three minutes each week (Center on Science Literacy, 2004; National Research Council, 2006). Flushing should be completed on schedule and properly documented.

Other issues that you will want to consider and address are:

Laboratory safety is the responsibility of everyone: parents, students, teachers, and administrators.

- Your school should have a chemical hygiene plan (CHP) that details procedures, rules, and responsibilities. Has this been recently reviewed and updated to reflect current practices and procedures?
- Your school should have a designated laboratory safety officer.
- Safety training is an on-going process. When was the last time that you and your colleagues participated in formal laboratory safety training review? Do you regularly discuss laboratory safety at science department meetings, and then document the discussions?
- Chemicals should be properly stored, separated by reactivities, in locked cabinets.
- An annual laboratory safety audit should be completed and documented. Air flow in fume hoods should be checked and monitored annually. Each lab should contain a fire blanket, eyewash, safety shower, fire extinguisher, signage, marked exits, evacuation plan, first aid kit, bodily fluids clean-up kit, goggles, MSDS sheets, and have a chemical spill kit easily accessible as part of the routine supplies and equipment.

There are several organizations, such as the National Safety Council and the Laboratory Safety Institute (Table 2) that will audit facilities, assist with staff training, and help develop a chemical

hygiene plan. The cost of these services is very reasonable, relative to placing students and staff at risk for laboratory safety accidents. You can also find safety training at the various science teacher conferences and through professional societies. Conferences frequently offer talks and sessions that address an unusual safety issue and can be used as on-going professional development for laboratory safety.

Much of your lab culture – the tone for the year – is set at the very beginning of the semester. That's why it's important to start the year with clear expectations for lab practices and behaviors, and to model safe lab habits throughout the year. Parents should be informed of potential hazards that students will encounter in labs before the year begins. They should be enlisted to review the safety contract and laboratory rules with their own child, and parents should also sign the safety contract.

During the Year –Educate, Eye Protection, Model

Besides signing a safety contract, one way to help ensure safe practice in the lab is to start the year with a safety quiz. Questions can be added to exams throughout the year to ensure that students retain this information. Students should be educated about the purposes of safety and equipment, such as eye protection and fume hoods, not just instructed to use them. You will enlist them in the process of working safely by engaging them in the purpose. At the start of each laboratory session students need to be reminded about previously encountered hazards and introduced and educated to new potential risks. Consider what protective equipment – goggles, gloves, face shields, aprons, and so forth - is required for the lab being conducted?

The Eye Protection in School Act (105 ILCS 115 et seq) requires students, teachers, and visitors to wear approved eye protection when in the laboratory. Appropriate eye protection has the code "Z87" stamped on it. *The Science Teacher* recently featured an article on eye and face protection in the laboratory (Kaufman, 2006). One should ensure that goggles are in good condition, fit well, and are appropriate for the hazards being used in the lab. They should be sanitized at the end of each class period, in preparation for the next group of students. This may be the one safety feature that we all have the most trouble with because some goggles don't fit over eye glasses well or don't fit some students comfortably. It is well worth it to invest in a variety of styles of approved eye protection so that they fit well and aren't a burden to wear.

Eye Wash
Safety Shower
Goggles and Sanitizing Cabinet
Fire Blanket
First Aid Kit
Telephone or Intercom System
Signage
Evacuation Plan
Chemical Fume Hood
Locked Chemical Storage
Fire Extinguisher
Flammable Storage
Caustic Storage
Chemical Inventory
Material Safety Data Sheets
Chemical Hygiene Plan

Table 1. Safety Features of Laboratories. This list includes some of the common safety features found in laboratories. Some items should be present in each lab, regardless of what the room is used for. Other items may serve several areas at one time.

Are you modeling good laboratory practices?

- Do you wear your eye protection?
- Do you leave your water bottle and food outside the lab?
- Do you wear close-toed shoes?
- Are your chemical bottles properly and clearly labeled?

At the End – Clean-up, Dispose, Review

At the end of each lab you will, of course, debrief about learning objectives. But you should also readdress laboratory safety. If a spill or other accident occurred during class, consider what may be done to avoid this in the future.

- Do students need more explicit instructions in handling biological materials, chemicals, or other laboratory hazards?
- Do students fully understand the risk of specific chemicals and hazards?
- Are you using micro-scale laboratories when possible?

Enlist students in the safety debrief, as well as in the learning debrief. If you instill a sense of ownership for safety, this will transfer to other lab classes and situations.

When you clean the laboratory at the end of class, make sure that all materials are safely put away, bench tops are cleaned, and that all chemical cabinets are locked. Used chemicals must be disposed of in the proper way. Sometimes this involves using a chemical disposal company. This chemical waste should be labeled, isolated, and properly stored until the end of the year. Do you have a backlog of old chemicals that were donated a number of years ago or that were previously purchased by someone who is no longer present at your school? Or do you have a number or large quantity of chemicals that don't get used at all? These are materials that should also be disposed of properly.

Conclusion

Laboratory safety is an on-going process for students, parents, teachers, and administrators. Everyone needs to be informed and to be responsible. Everyone needs to stay up to date and to continually revisit laboratory materials and training. Each time that I review materials on lab safety, I learn something new and pick-up a hint or tip. This article is obviously not a comprehensive piece about laboratory safety, but is intended to remind us about some of the basics and to provide information about resources that will assist all of us in practicing safe science with our students and in instilling in them a sense of working safely in the laboratory.

Flinn Scientific (a vendor of science supplies, lab equipment, source of safety information); http://www.flinnsci.com
Illinois Science Safety Manual, compiled by the Center on Scientific Literacy, Illinois Board of Education (source of information for teachers); http://www.isbe.net/ils/science/pdf/science_safety.pdf
Laboratory Safety Institute (conducts safety audits and provides information); http://www.labsafety.org
National Safety Council (has a local office and conducts audits and provides information); http://www.nsc.org.
National Science Teachers Association (provides standards for science teaching); http://www.nsta.org

Table2. Laboratory Safety Resources. These organizations are good sources of laboratory safety materials, especially for Illinois science teachers,

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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,

Be submitted electronically, as an email attachment or on disk (IBM or Mac), saved in Word format,

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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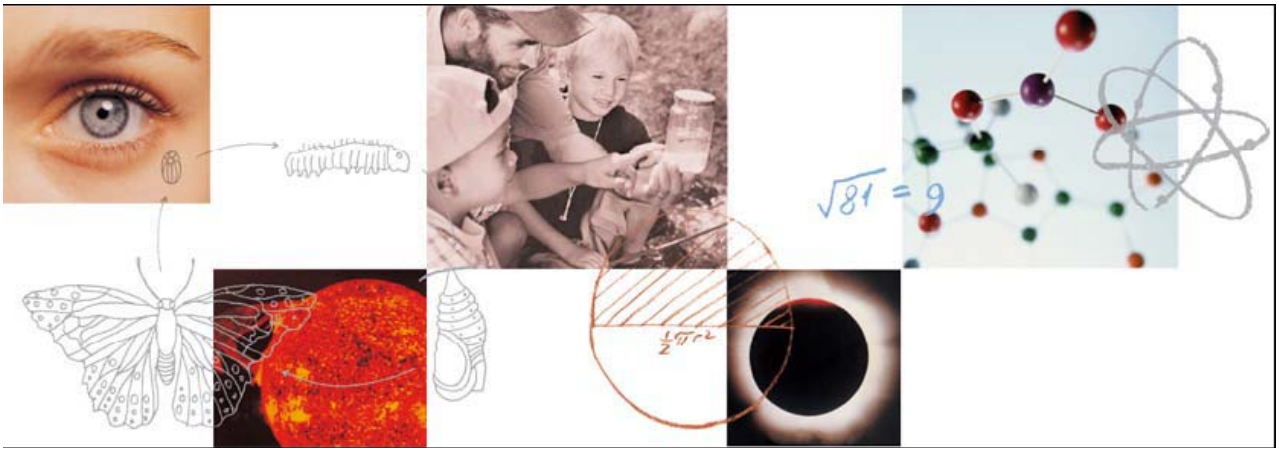

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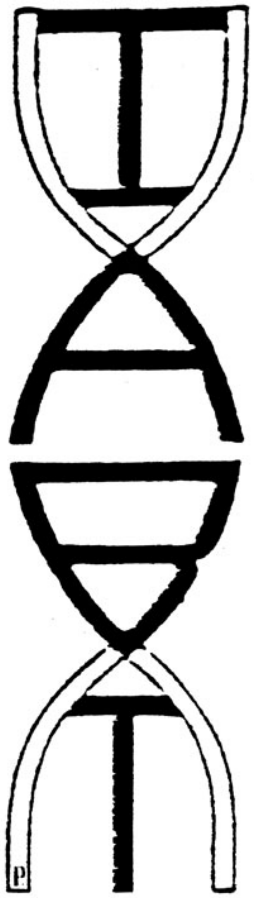

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December 26th 2006 – January 3rd 2007

Join Dr. Marylin Lisowski and fellow educators this winter as we explore the biodiversity and culture of the Yucatán's Northern Caribbean Coast. Due to the reputation and development of Cancun, the Yucatan Peninsula is often overlooked for the rich educational and scientific discoveries that abound in this region. Our explorations will take us to the Sian Ka'an Biosphere Reserve (Yucatec for 'where the sky is born') a 1.6 million acre protected area where an extraordinarily diverse array of ecosystems and wildlife can be found: Lagoons, reef, mangroves, tropical forests and savanna of Sian Ka'an protect jaguar, jaguarundi, howler monkeys, tapirs, crocodiles, turtles, manatees, millions of birds along with many other creatures. We will delve into the crucial social and biological issues behind sustainability and conservation as we explore the reserve. We will accompany crocodile tagging teams on the Caribbean coast as we work to save this ancient species from extinction. Join us as we investigate the fascinating limestone geology of the peninsula, the regions sinkholes, hydrology and its effects on the coastal reef. This winter workshop will take you far away from the hotel laden beaches of Cancun and offer a glimpse of the people and environments of the Yucatan Peninsula.

You may call Holbrook at 888-890-0632 at anytime as we look forward to supporting your interest in the field. Indicate your interest in Eastern Illinois University Winter Session. You may also contact Dr. Marylin Lisowski at: mlisowski@eiu.edu or 217-581-7830.

A Vision of Excellence:

Building the Future through Science Education

ISTA 2006 Conference on Science Education

Friday and Saturday, November 3 and 4, 2006
Preconference: Thursday November 2, 2006

Location: Peoria Civic Center
and
The Hotel Pere Marquette

Earlybird Regisration Deadline 10/02/06
ISTA member - $100
Nonmember (includes membership) - $135

Advance Registration Deadline 10/23/06
ISTA member - $115
Nonmember (includes membership) - $150

Full Rate Registration (After 10/23/06)
ISTA member - $125
Nonmember (includes membership) - $160

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

http://www.ista-il.org/conference/index.htm

Join Us in Peoria!
ISTA Conference 2006
A Vision of Excellence: Building the Future Through Science Education

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