SPECTRUM

ISTA

Fall 2013, Vol. 39, No. 2

The Journal of the Illinois Science Teachers Association

In this Issue: **Thinking Outside the Shell: Operation Endangered Species**
Become a Weedtracker! Mapping Invasive Species
Investigating Science at Home

Plan Ahead:
Illinois Science Education Conference - October 24 - 26, 2013 in Tinley Park, Illinois
NSTA National Conference on Science Education - April 3 - 6, 2014 in Boston, Massachusetts
STEM Forum and Expo - May 14 - 17, 2014 in New Orleans, Louisiana
NSTA National Conference on Science Education - March 26 - 29, 2015 in Chicago, Illinois

SPECTRUM

The Journal of the Illinois Science Teachers Association

Fall 2013 Volume 39, Number 2

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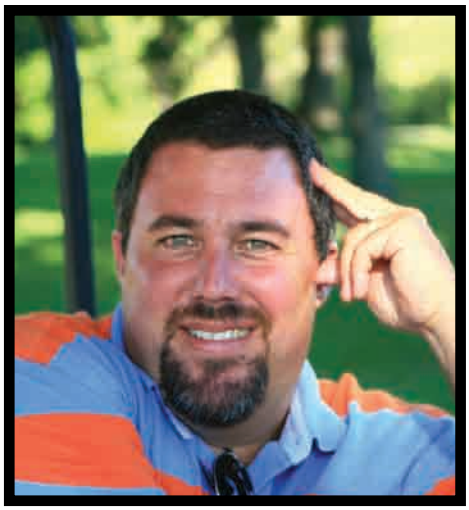
President's Corner

Paul Ritter



Fall is one of my favorite times of the year. The changing colors and falling leaves can be simply breathtaking in our great state. I think what I enjoy most about fall is getting back to school. While the summer is a nice and much deserved break from what we do, I can't wait to see the kids again and hear all of their summer stories. It is awesome.

Equally exciting are the things taking place within your ISTA. Recently, we sent out an electronic survey to the membership regarding the implementation of the Next Generation Science Standards (NGSS) in Illinois. I am excited to report that our members responded with very positive support for adoption of the NGSS and a great desire for professional development for implementation of them. You can find the results on the ISTA website (www.ista-il.org). This month, the ISTA executive board will present their findings to the Illinois State Board of Education to show our support for them to move forward with the adoption of the NGSS. I am ecstatic to report that ISTA is working with the Illinois Principals Association on NGSS professional development webinar opportunities that will be available to you sometime this year.

I don't know if you have noticed, but October is knocking on our door which means that this year's Illinois Science Education Conference (ISEC) is right around the corner. This ISEC, *Wild About NGSS*, in Tinley Park could turn out to be the best conference we have had to date. Wendy Jackson, Hethyr Tregerman, Ken Wester, and a host of others have put in hundreds of hours and scheduled some of the best presenters our conference has ever seen. With over one hundred and twenty presentations scheduled equally on Friday and Saturday, everyone will have an opportunity to see the very best that this year has to offer. This year's Friday night gala, Safari Soiree, including dinner, networking, music, fun, live animals, and many surprises, is going to be a big hit. The ISEC lunch keynote speaker is Bill Street and his team from Sea World Busch Gardens. Accompanying them are the team's favorite friends from the animal kingdom. Penguins, alligators, armadillos and more will make our lunch time one of the greatest shows on Earth. By the way, I overheard talk that the penguins get to drive the bus up from Texas. Hope to see you there.

Finally, I want to take a moment to say thank you for all you do, all day, and every day. Our job is not an easy one. Each of you inspires students to greatness while dealing with the many issues that each day brings. We are role models, councilors, parents, coaches, and science teachers. There is no such thing as a normal day. You make the difference in our children's lives and I thank you.

2013-15 ISTA Executive Committee

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NSTA 2015

in Chicago at McCormick Place

March 26 - 29, 2015

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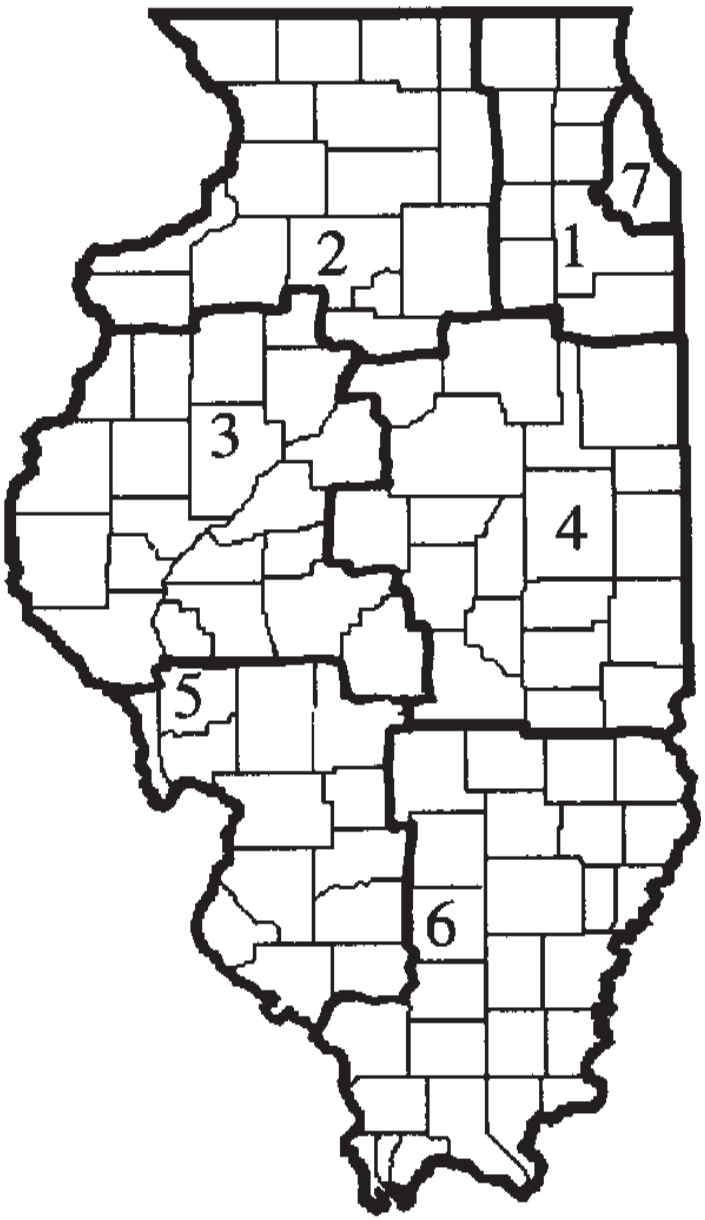

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http://www.ista-il.org/

According to ISTA bylaws, regional directors may serve only two consecutive terms. Directors noted with an "a" are in the first of a two-year term; those noted with a "b" are in the second consecutive two-year term.

Illinois Science Teachers Association

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: Pamela Spaniol (email: pamela.spaniol@yahoo.com), ISTA Membership, PO Box 312, Sherman, IL 62684.

Membership Option (see below)_____ FFSE Membership Yes/No _____ 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.
Option 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.
Option 6: Initial Certificate Option - $20.00. Full membership benefits to beginning teacher in the first to fourth year of teaching.

Fermilab Friends for Science Education (FFSE): Thanks to an ISTA-FFSE board agreement, for Options 1, 4, 5, and 6, teachers may receive a regular $10 membership in the FFSE for an additional $4.
See http://ed.fnal.gov/ffse/ for membership details.

Illinois Section - American Association of Physics Teachers (Is-AAPT):
Option A: College faculty will receive both ISTA and IS-AAPT memberships for $55 (+$20);
Option B: K-12 faculty will receive both memberships for $45 (+$10);
Option C: Full time college students and retirees will receive both memberships for $15 (no additional charge);
Option D: K-12 teachers in their first through fourth year of teaching will receive both full memberships for $30 (+$10).
See http://isaapt.org/ for membership details.

ISTA Thanks

Illinois Petroleum Resources Board

Sponsor of the ISTA Student Medallions and the ISTA Summer Workshop for Teachers

Thank You IPRB!

NSTA National Conference on Science Education

Boston, Massachusetts

April 3 - 6, 2014

Future Science Education Conference Plans

(tentative)

2013 - ISEC - Tinley Park Conference Center, Tinley Park, Oct. 24 - 26, 2013
2014 NSTA National Conference on Science Education in Boston, April 3 - 6, 2014
2014 STEM Forum and Expo in New Orleans, May 14 - 17, 2014
Fall 2014 Science Education Conference, Southern Illinois
2015 NSTA National Conference on Science Education in Chicago, March 26 - 29, 2015

2013 ISEC Schedule

Thursday, October 24, 2013

5:00PM - 8:00PM **STEM Education Dinner Symposium** for Illinois school leaders
An introduction to NGSS and CCSS for Mathematics designed for administrators, supervisors, and board members.

6:00PM - 9:00PM **Exhibit Hall Opening with Reception**

Friday, October 25, 2013

7:30AM - Noon **Exhibit Hall** open
continental breakfast in the morning

9:00AM Plenary Session Speaker **Dr. Brian Reiser** of Northwestern University
What do the 2011 NRC Framework and the Next Generation Science Standards Mean for K-12 Science? Exhibit Hall North and West Rooms

10AM - Noon **Presentations and Symposia**

Noon **Presidents' Luncheon** and Awards
Luncheon Speaker **William (Bill) Street** of SeaWorld Education
The Conservation Leader in Your Classroom

1:15PM **Professional Association Meetings**
Illinois Association of Chemistry Teachers
Illinois Association of Biology Teachers - Bremen Room

1:15PM - 4:30PM **Science Flea Market** (STUFF) in the Exhibit Hall

1:15PM - 4:30PM **Exhibit Hall** open

2:30PM - 4:30PM **Presentations and Symposia**

4:30PM **Raffle** in the Exhibit Hall

4:45PM **ISTA Membership Meeting** - South Pavilion 1

6:30PM - 10:00PM **Safari Soiree Gala**
Includes dinner, networking, music, fun, live animals, surprises.

Saturday, October 26, 2013

7:00AM - 9:00AM **ISTA Board of Directors Meeting** - Plantain Room
continental breakfast

8:00AM - 1:00PM **Science Flea Market** (STUFF) in the Exhibit Hall

9:00AM - 3:30PM **Sessions and Symposia**

11:45AM **Raffle and Boxed Lunch - South Pavilion Room 1**

Registration Hours

Thursday 10/24/13	Friday 10/25/13	Saturday 10/26/13
TPCC South Entrance	TPCC South Entrance	TPCC South Entrance
12:00 PM - 8:00 PM	7:00 AM - 4:30 PM	7:00 AM - 2:00 PM

Plenary Session

Dr. Brian Reiser

Northwestern University

What do the 2011 NRC Framework and the Next Generation Science Standards Mean for K-12 Science?

Exhibit Hall North and West Rooms

Friday, October 25, 2013

9:00 AM - 9:50 AM

Tinley Park Conference Center

The Tinley Park Conferene Center (TPCC) is located about twenty miles east of Joliet at the intersection of I-80 and IL43 (Harlem Avenue). It offers free parking, free WIFI, easy roll-in ground floor setup, and vendor-friendly management. TPCC has recently doubled in size and it is attached to the Tinley Park Holiday Inn Select with a conference rate of $112 plus tax (single or double). TPCC is accessible from all directions by interstate highways, and is sixteen miles south of Midway Airport.

Conference Highlights

Exhibit Hall Opening and Reception
Thursday, October 24, 6:00 - 900 PM

Reception, food, refreshments, and exhibits!

William (Bill) Street
Sea World Education
Friday Noon Luncheon Keynote
The Conservation Leader in Your Classroom

Science Flea Market
Friday 1:15 PM - 4:30 PM
Saturday 8:00 AM - 1:00 PM
Exhibit Hall

Raffle of Thousands of $$$$ of Science Materials and Services
Friday 4:30 PM in the Exhibit Hall
Saturday 11:45 AM in the South Pavilion Room 1
(you must be present to win)

Gala

Safari Soriee

Tinley Park Conference Center

Friday, October 25, 6:30 - 10:00 PM

Food, Fun, Refreshments, Colleagues

This is an excellent opportunity for you to meet informally with your fellow science educators, while enjoying food, beverages, live animals, and a few surprises!

Pre-registration required: Tickets are $35
Check at the registration desk for ticket availability

Visit the ISEC Exhibit Hall!

Achieve 3000 www.achieve3000.com
Anatomy in Clay Learning System www.anatomyinclay.com
Bedford, Freeman & Worth Publishers & W.H. Freeman www.bfwpub.com
Bitwixt Software Systems www.bitwixt.com
Brittanica Digital Learning www.eb.com
Brookfield Zoo www.brookfieldzoo.org
Bully Be Gone, Inc. www.bully-b-gone.org
Carolina Curriculum, www.carolinacurriculum.com
CPO Science www.cposcience.schoolspecialty.com
Delta Education www.delta-edu.com
Educational Innovations, Inc. www.teachersource.com
Environmental Education Association of Illinois www.eeai.org
Fermilab Education Office http://ed.fnal.gov
Flinn Scientific www.flinnsci.com
Fisher Science Education www.fishersci.com
Forest Preserve District of Will County www.reconnectwithnature.org
Frey Scientific www.freyscientific.com
Green Edventures www.greenedventures.com
iBIO Institute Educate Center www.ibioed.org
Illinois American Water Company www.illinoisamwater.com
Illinois Association of Aggregate Producers www.iaap-aggregates.org
Illinois Association of Biology Teacherswww.illinoisbio.com
Illinois Association of Chemistry Teachers www.iact-online.org
Illinois Deptartment of Natural Resources www.dnr.illinois.gov
Illinois Environmental Protection Agencywww.epa.illinois.gov
Illinois-Indiana SeaGrant www.iisgcp.org
Illinois Petroleum Resources Board www.iprb.org
Illinois Section American Water Works Association www.isawwa.org
Illinois Science Olympiad www.illinoisolympiad.org/
Illinois Science Teachers Association www.ista-il.org
Illinois State Geological Survey www.isgs.illinois.edu
Illinois Water Environment Association www.iweasite.org
It's About Time, www.iat.com
Laser Quest, www.laserquest.com
Lights for Learning, www.lights4learning.org
McGraw-Hill Education www.mh.education.com
Micro Tech Microscope Sales and Service www.scopeman.com
Millmark Education www.graceeducationalresources.com
NASCO www.enasco.com
National Energy Education Development Project www.need.org
Nutrients for Life, www.nutrientsforlife.org
PASCO www.pasco.com
Pearson www.pearsoned.com
Presidential Awards for Excellence in Mathematics and Science Teaching www.paemst.org
St. Louis College of Pharmacy www.stlcop.edu
Sangari Active Science www.sangariglobaled.com
Scientific Minds www.scientificminds.com
Scope Shoppe www.scopeshoppe.com
SeaWorld Parks and Entertainment http://seaworldentertainment.com
Ward's Science www.wardsci.com
Western Michigan University www.wmich.edu
Vernier Software and Technology www.vernier.com

Tinley Park Conference Center

Visit with vendors, scientists, fellow teachers, and government, industry, and organization leaders on science education issues

Hours

Thursday 6:00PM - 9:00PM
Includes Reception

Friday 7:30AM - Noon
and
1:15PM - 4:30PM

Entrance to Exhibit Hall with conference identification badge only

ISTA General Membership Meeting Friday October 25 4:45 PM South Pavilion 1

This session of the convention affords the members of the Illinois Science Teachers Association the opportunity to express their ideas, concerns, and suggestions to the board regarding the future directions of the association. All members (including those who have just joined at this convention) should plan to attend. You won't want to miss it!

ISEC Thanks

McGraw Hill

Patron of this year's conference

NSTA National Conference

Coming to Chicago!

March 26-29, 2015

Great Lakes/Great Ideas

Want to Present?
See the conference strands on the next page ...
The Call for Proposals opens September 2014:
http://www.nsta.org/conferences/sessions.aspx
Deadline for Chicago NSTA 2015 Proposals is April 14, 2014

Want to Volunteer?
Assistance is needed from reviewing session proposals to volunteering at the conference helping attendees, supervising field trips, stuffing conference bags, and more.

Local Contacts

Conference Chair Wendy Jackson - wjackso7@depaul.edu
Program Coordinator Natacia Campbell - natacia.campbell@gmail.com
Local Arrangements Coordinator Judy Scheppler - quella@imsa.edu

NSTA 2015

NSTA National Conference
Chicago, Illinois at McCormick Place
March 26–29, 2015

Chicago: Great Lakes/Great Ideas

Strand One: Natural Resources, Natural Partnerships
Sustaining natural resources requires collaborative partnerships among many stakeholders, and science is the key to making smart decisions about resources. Educators and students can engage with environmental groups, agencies, and businesses to build and support a sustainable future. This strand will help teachers identify possibilities and potential partnerships.
Goal: The workshops and presentations will focus on one or more of the following:
- Providing examples of successful partnerships and/or educational outreach efforts focused on natural resources
- Developing opportunities for new partnerships
- Demonstrating that environmental education can happen everywhere (e.g., in urban, suburban, or rural settings)
- Modeling evidence-based decision making to support a sustainable future, as described in the NRC *Framework* and the NGSS

Strand Two: Teaching Every Child by Embracing Diversity
All classrooms are diverse. Learners bring a variety of cultures, backgrounds, and experiences to the study of science. Educators must provide opportunities to meet the needs of all students, including English language learners, students with special needs, and those with diverse learning styles and abilities. Successful instructional approaches must address methods, materials, facilities, and partnerships. These sessions will confirm the belief that every student can excel in science.
Goal: The workshops and presentations will focus on one or more of the following:
- Sharing success stories in which educators and students have met unique challenges
- Providing research-based instructional practices for diverse learners
- Encouraging teachers to embrace and celebrate student diversity
- Providing examples of effective instructional methods for special needs, English language learners, and other diverse learners

Strand Three: The Science of Design: Structure and Function
Architecture and engineering provide the infrastructure for human-made systems. Designing for the future requires imagination and a commitment to sustainability. It also involves the crosscutting concepts of structure and function and the practices of science and engineering. Communities like Chicago provide examples of great design and great science.
Goal: The workshops and presentations will focus on one or more of the following:
- Describing how engineers and architects use the practices of science and engineering to improve our infrastructure
- Modeling how science, technology, engineering, and mathematics are used to create sustainable systems
- Integrating science and engineering with other disciplines, like visual arts and the social sciences to improve design, human welfare, and planet Earth.
- Demonstrating how to model engineering practices in authentic scenarios for learners of various ages
- Providing examples of STEM-related careers

Strand Four: Student Learning: How Do We Know What They Know?
The goal of every teacher is to maximize student learning. Monitoring learning is the responsibility of both the teacher and the student. To successfully monitor learning requires authentic assessment, including formative and summative strategies. The progressions embedded in the NGSS provide opportunities for students to engage in the practices of science and engineering; these should be assessed through a variety of modalities.
Goal: The workshops and presentations will focus on one or more of the following:
- Demonstrating the scaffolding of K–12 science learning using the NGSS progressions
- Modeling authentic formative assessment strategies
- Building on past assessment practices to align with the vision of the NRC *Framework*
- Aligning preK and post-secondary experiences with the NGSS learning progression
- Providing resources for authentically assessing the NGSS, both formatively and summatively

ISTA and ISEC

Greatfully Acknowledge

Our Donors, Supporters, and Sponsors

ISTA is greatful to the **ExxonMobil Foundation** and the **Chicago Drug and Chemical Association** for financial support of the ISTA Outstanding Teachers of Science and New Teacher of Science awards.

Support for ISEC from C-STEMEC

comes from the Searle Funds

at The Chicago Community Trust

ISEC Thanks

PASCO

Saturday Lunch Sponsor

Articles

Thinking Outside the Shell: Operation Endangered Species

Michael Soares
Pontiac Township High School

Spotlight on Students

"Henry David Thoreau once stated, 'What you get by achieving your goals is not as important as what you become by achieving your goals.' That is our mission and that is what Operation Endangered Species is all about." The day was November 12, 2012, and Baylee Ritter, sophomore at Pontiac Township High School (PTHS), stepped away from the microphone. In front of classmates, faculty, and reporters, the students wearing light green t-shirts emblazoned with the program logo filed onto the stage. Behind them came myself, ISTA president and PTHS biology teacher Paul Ritter, Illinois Department of Natural Resources endangered species coordinator Joe Kath, ISTA executive director Harry Hendrickson, Illinois senator Jason Barickman, and an assortment of others connected to education and environmental conservation. The event was a culmination of conservation-oriented curriculum based on the work developed by these resourceful students. Earlier in the summer, Paul Ritter and I collaborated to write a grant through State Farm's Youth Advisory Board, an organization which seeks to fund innovative curricular efforts, and on this occasion our students were accepting a very large check. To our amazement and pleasure, we were awarded $100,000 to continue our work. As we were presented the oversized cardboard check onstage and in front of television cameras, it became clear that Operation Endangered Species (OES) was destined to exceed our expectations as a local program. With our newfound funding, OES could become a vehicle for bringing conservation-minded curriculum across the state of Illinois.

Later that morning, back in his classroom, Ritter held an alligator snapping turtle out for the visitors to hold. "Will it snap my finger off?" a student asked with trepidation. "Probably not," responded Ritter, "but it does have bite!" In fact, schools from the northern suburbs to the southern tip of the state have been bitten with excitement for alligator snapping turtles and teachers have been using OES to inspire students both inside and outside the classroom. OES, led by students and assisted by organizations such as the Illinois Department of Natural Resources (IDNR), Peoria Zoo, Illinois American Water, Tetrafauna, and ISTA, has been reaching out to other schools across the state to motivate students with innovative curriculum and to make a lasting impact on the reestablishment of the species in its natural habitat. As the program grows, the students have enjoyed real-world practice in science, enhanced curriculum in other disciplines and in particular English, as well as public accolades,

my Conservation Biology professor at Eastern Illinois University. Since she was editor of *Outdoor*Illinois magazine, I recruited Kathy to help us with any grant writing." Early in the process, Ritter contacted Tetrafauna, a company that manufactured fish tanks with locking covers which could serve as a perfect containment and living space for the feisty ASTs. The company became one of the programs first benefactors when it donated the necessary habitat and filtration equipment to OES. With the equipment now in place, it was time for the turtles to arrive at the high school. As students, teachers, reporters, and news cameras looked on, four turtles named Big Blue, Little Blue, Missy, and Red arrived from the Peoria Zoo.

Goals

With the turtles in place, success for the pilot program meant demonstrating the potential for interdisciplinary curricula. Within PTHS, teachers began looking at their lesson plans and discovering ways to use OES to enhance their curriculums and student outcomes. After a fruitful semester of interdisciplinary collaboration within our own building, the next phase was to expand the outreach to willing educators outside of Pontiac. With PTHS serving as a hub school, the program sought to place turtles in a variety of host classrooms in districts across the state, creating a network which will be eventually self-sustaining.

"Hands-on animal activities in the classroom not only introduce or reconnect kids with nature, they most importantly foster a love and passion for wildlife by those kids, that is carried with them for a lifetime."
- Dr. Brady Barr

Students measure the size of an alligator snapping turtle using calipers.

Host classrooms, in addition to feeding and caring for the guest turtles, transformed students into scientists as they use calipers and scales to complete regular measurements and post all information on a central database located on the OES website. Similarly, all curricula developed in host classrooms can be posted to the website for sharing. Participating educators now have the ability to place classroom materials and lesson plans into grade appropriate areas ranging from kindergarten to upper level high school. With the adoption of the Next Generation Science Standards and Common Core State Standards, it is important that OES support the tenets of those initiatives, and in particular the writing standards for Literacy in Science. In practice, as students are measuring and recoding AST data, the information can be used to create a variety of writing assignments including informative/explanatory texts, written documentation of scientific procedures/experiments/technical

Regular and precise measurement of turtle size are important for determining growth and appropriate release

and the satisfaction of seeing their hard work turn an idea into fruition.

Genesis

Traditionally, educators at PTHS have enjoyed administrative support to engineer creative curriculum to capture the attention and imagination of students. Ritter, in particular, has taken advantage of this flexibility to develop a handful of projects including the Pontiac Storm Sewer Stenciling Program, the Crayon Recycling Program, and most significantly the Prescription Pill and Drug Disposal Program (P2D2), a cross-disciplinary initiative which has received international recognition. With the implementation of the Next Generation Science Standards (NGSS) as well as the national Common Core State Standards (CCSS), it became clear that programs such as these were ahead of the curve in terms of achieving the new mandates: more hands-on and real-life applications, as well as cross-curricular collaboration and multi-generic reading and writing. Eager to replicate and eclipse his previous success, Ritter began an intense investigation into new possibilities, ultimately receiving inspiration from a personality well-known to the science community.

The seeds of OES were planted when Ritter, then ISTA president-elect, encountered *National Geographic* celebrity host Brady Barr at the 2011 ISEC conference in Tinley Park, Illinois. Immediately feeling an affinity for one another, they brainstormed and decided to initiate a conservation project with Ritter's students. After describing the opportunity to his students, Ritter, encouraged by their feedback and enthusiasm, then began the search for a suitable endangered species to revive in Illinois, carefully evaluating what would have the most meaningful impact in his classroom. Ritter knew that it was important for his curriculum have a *real-world scientist* experience, which included raising the animals, measuring them, collecting vital statistics, tagging them, and releasing them into their natural habitat. After careful consideration, Ritter soon settled upon alligator snapping turtles (AST) as the perfect vehicle for the project, and with collaboration from Barr and PTHS students, the project swiftly began to take shape.

Soon IDNR became involved, and according to Ritter, "This program is possible due largely to the ground work that was established by the AST recovery team and the direction of the endangered species manager Joe Kath. I met Joe after I contacted the IDNR with the idea, and they said Joe was in charge of all the endangered species in Illinois. Man, what an awesome responsibility." Also becoming involved was Kathy Andrews, a longtime Ritter collaborator. "Kathy's dad was

A student from Pontiac High School shows off her alligator snapping turtle fromOperation Endangered Species. Students gain confidence and are proud of the work that they do to help save an endangered species.

Ultimately, all classes met and collaborated with science teachers and their students during, and also outside of, class. As OES grows, the list of creative applications and successes grows larger as educators find new ways to use the program to extend learning past the classroom walls.

Procedures

As the OES protocols are developed, schools will eventually be able to apply for the opportunity to host a turtle. Applications will be reviewed not only by a board of educators, but by a council of students who will have training and know-how regarding the operation of the program. After a host classroom has been identified, the next task is for that teacher to apply for a permit to possess an endangered species with the Illinois Department of Natural Resources. Once accomplished, consideration needs to be given to the classroom environment created for the turtles. As noted in the "Raising an Endangered Species" section of *Alligator Snapping Turtle Classroom Curriculum Care Guide*, "By participating in Operation Endangered Species you are agreeing to help raise a wild animal which eventually will be released to the former, natural habitat of the species. The goal of Operation Endangered Species is to help raise animals that are independent and capable of hunting and feeding on their own, and have a healthy fear of their natural predators - including humans. Maximizing the chances these turtles will survive when released into the wild means that they must not be treated as a pet, or that their school environment resembles a zoo. Turtles should be placed in a secluded corner of a classroom, and, when feasible, a natural screen placed between the aquarium and the classroom. Contact with the turtles should be minimized, and a schedule established for contact and observation periods."

Assisting in the maintenance of the turtles is the correct equipment. Required is a filtrated aquarium-grade tank that is 30 x 18 x 12 inches or larger, with a padlock in order to protect both students and the turtle. Inside the tank, along with aquarium grade water, a heater and thermometer are required. Also needed is a light with a timer (so the turtles do not get more than twelve hours of light) and a rock, brick, or small log for the turtle to "wedge" itself under. In addition to a caliper, host classrooms need a scale to document size. Finally, schools need to provide live food. According to the *Guide*, "The alligator snapping turtle is a species that prefers live food. A unique adaptation of the AST is their red mouth lure which wiggles to draw its prey into the range of the turtle's powerful bite. Food preferences include, but are not limited to, fish, frogs, tadpoles and small crayfish. Food selection will evolve as your turtle grows. With that being said, a good rule of thumb would be that the food source be no bigger than three times the size of your turtle's head." All live food is easily and inexpensively obtained at a local pet supply store.

Care and safety go hand in hand for both the turtles and students. For the turtles, the tank must be cleaned and the filtration checked weekly. The tank water must be changed bi-monthly and any uneaten food must be removed. Additionally, in order to avoid over-production of algae, the tank must be kept out of direct sunlight. Finally, custodial staff must be careful not to spray chemicals or cleaners on or near the tanks. For the students, in addition to the tank having a lock, the teacher or another responsible adult must always be present when the turtles are being handled. Wearing latex gloves while handling the turtles is always an option; otherwise, hands should immediately be disinfected after turtles are placed back in the tank. When holding the turtle, the prevailing wisdom is to pick it up from behind and keep fingers away from its jaws because, as is well established, it is a *snapping* turtle.

Our students are working as scientists and data collectors, and are raising the turtles to reintroduce them into the wild.

processes, or other assignments yet to be developed by invested educators.

Furthermore, each of the standards for production and distribution of writing as well as reaching to build and present knowledge, regardless of the age or grade range, are addressed by actions taken in the classroom to maintain the OES program. As educators, students, and others invested in the process report success, the database grows and teachers can share, research, and modify curriculum as they find something that works in their classroom. Each addition to the curriculum website will be created to uphold OES's mission: "To engineer innovative education techniques through the use of pioneering interdisciplinary curriculum designed to empower students to write in a wide variety of new and familiar genres, to collaborate with a spectrum of students and professionals in multiple contexts, and to foster the eco-conscious objective of restoring an endangered species to a breeding population in its historical habitat."

Ritter puts it best when he says, "This is off the chart. Our students are working as scientists, and data collectors, and are raising the turtles to reintroduce them into the wild. Our kids are junior scientists." Accordingly, as the turtles reach maturity and their terms in the host classrooms reach their conclusions, they will be released back into their natural habitat. The Cache River Watershed, located in southern Illinois, is currently the designated location for release. Teachers and students are invited to witness the release and as an end cap to their participation and to experience firsthand the results of their conservation efforts.

Applications

The ASTs in the biology classroom have been a great benefit to Ritter's students as they have been able to study an endangered species firsthand. Likewise, students have had the opportunity to research both how species become endangered and to practice measures helping in their repopulation. The enthusiasm over ASTs has by no means been limited to Ritter's classroom. With local news coverage, a 24-hour turtlecam, and enthusiastic students in other departments, the excitement has been spreading. Media exposure granted OES publicity which has manifested itself in everything from politicians using the positive public relations during the campaign season to requests from students and educators from schools even beyond Illinois' borders to participate in the program. In two of my courses, English II, populated by sophomores and older students repeating the course (many with special education accommodations) and Rhetoric II, my honors English class, students formed initiatives which created multi-media portfolio projects including internet public service announcements, pamphlets, posters, and even a bake sale to spread awareness of the program. In Rhetoric II, students spent months developing a classroom care guide, forcing them to write in multiple genres and research a wide range of information from multiple disciplines. The *Alligator Snapping Turtle Classroom Curriculum Care Guide* is now the guiding document distributed to teachers and host classrooms as they initiate their own curricular endeavors based on the OES program. In other parts of the PTHS campus, social science classes wrote letters to legislators explaining the program and seeking support. A music class produced a theme song for the program and produced it in a recording studio. And art classes created banners to use for presentations and community outreach projects.

Students who are caring for the snapping turtles in the classroom must follow proper safety practices, clean aquarium tanks, check filters, and make sure that food is appropriate.

A student from Metcalf Elementary School in Normal, Illinois shows one of the turtles that her class is rehabilitating. Operation Endangered Species has beens successfully exported to other Illinois schools, with Pontiac High School students writing the Classroom Curriculum Care Guide.

Outreach

Reaction from the educators in the initial outreach of OES were overwhelmingly positive. Jenn Carey, sixth grade science and reading teacher at Washington Middle School in Washington, Illinois, was one of the first classrooms to host turtles outside of Pontiac. She writes, "OES has been a wonderful learning experience for the students at Washington Middle School. It is great to see them able to connect to the curriculum in such a personal way. The kids did a research project on endangered species. This idea came as a catapult of having our own endangered species in our room. The kids were invested in learning about other species that are endangered and have come to love our turtle! We have held a bake sale to help support this project; all of the kids were so excited to help! It has been great to be a part of Operation Endangered Species and I am excited to continue in the efforts!"

While the Ritter-Soares collaboration at PTHS was conducted primarily with high school students, a conjoined effort with Carey and Washington Middle School language arts teacher Deb Riggert-Kieffer proved the mobility of the goals of the program to other grade levels. According to Riggert-Kieffer, "As for the work we did with our students, we used the alligator snapping turtle as a basis for research projects that students self-selected. Kids chose endangered animals from the website Arkive.org and wrote research papers informing an audience of peers about their animals. They included information like scientific name, animal description, habitat, range, and conservation efforts. Students also completed a works cited page. I asked students to use APA citation because that is the citation format used in science and modeled on the Arkive website. I thought MLA would be too confusing and wanted to be authentic to what happens in science. They also made suggestions for how people could help the species. In my class, I created student books for each section to be placed in my library for student check out. We also did *author's chair* so students had the opportunity to read the work to the intended audience. I also had students write about the project including their

Students gain important scientific skills and learning is more meaningful to them when they are actively engaged in real-world research.

strengths and challenges. Students wrote about the grade they thought they earned and wrote a rationale for that grade. "

Future

Writes Dr. Barr, "Hands-on animal activities in the classroom not only introduce or reconnect kids with nature, they most importantly foster a love and passion for wildlife by those kids, that is carried with them for a lifetime. [It] can literally change a kid's life. I am a living breathing, example of that" B. Barr (personal communication October 3, 2012).

In that light, Ritter and I have sought to expand the program not just to lower grade levels but also into the university. We are currently working with Illinois State University's Biological Science program to possibly initiate research for undergraduate or thesis projects in "The Recovery Model" for graduate students. The ultimate hope is to cross over to other university departments, such as English and social sciences, where the project could create studies in writing in various genres and the study of the civic components in creating a statewide eco-conscious program. As the student-driven Operation Endangered Species gains traction, collaborations between classrooms and corporations like State Farm, as well as organizations such as ISTA and IDNR, will bring the bite of excitement felt by the students in Pontiac to schools all across the state and beyond.

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Soares Rhet II Snapper Initiative: http://

Become a Weedtracker!
Mapping Invasive Species Using GPS and Google Earth

Meredith L. McAllister and Abigail Soltis
Butler University

Invasive species are non-native plants and animals that crowd out native wildlife and potentially damage valuable habitat. In the following activity, students learn how to identify and map invasive plant species, such as honeysuckle, commonly found on school grounds (typically along a field/forest transition zone). Tracking these "weeds" is easy using the global positioning system (GPS) technology available on handheld units such as the Garmin E-trex Legend. Students can learn to map locations of invasive plants using GPS units and selecting the weed as a *waypoint.* These waypoints can then be mapped using Google Earth. The locations of invasive plant species can be tracked from year to year to measure growth over time and for future eradication. For detailed information on how to map invasive species and a general primer on using hand-held GPS units, see http://www.citsci.org/DH.php?WC=/WS/CitSci/Tutorials_Wisconsin/Tutorial2_Static.html[1]

Objectives
Students will be able to use a GPS receiver and latitude/longitude coordinates to find toothpicks of various colors as geocaches located on your school campus and determine the latitude/longitude of four different locations of invasive species.

Materials
- GPS receivers
- Clip boards
- Data collection sheets
- Hidden toothpicks of various colors as "geocaches"
- Latitude/longitude coordinates of a specific object

Safety
Students may wish to use sunscreen and/or bug spray and wear hats and close-toed shoes. It is important to remind students of natural obstacles on school grounds and how to avoid those areas on campus that are considered off-limits to students.

Illinois State Science Standards: Goal 11 and 13

Instructions
1. Your class will divided into groups of two based on the number of GPS units.
2. Review the basic instructions for acquiring satellites and displaying latitude/longitude position.
a) turn on receiver;
b) hold receiver horizontal and clear of any objects that may block the satellites;
c) when the receiver switches screens, enough satellites are being tracked and the receiver has calculated your current position.
3. Get the latitude/longitude of the object your group is to find from your instructor.
4. Find the object from the clues given.
5. After you have found your assigned objects and invasive species, return to the classroom.
6. Did you have any challenges finding the object? Would it have been easier to get directions?

Example Data Collection Sheet

Part I: Find the GPS coordinates of four different locations of invasive species.

Invasive species	GPS Coordinates

Part II: Follow the GPS coordinates to a location on your school campus and use the clues to find each geocache. Collect 1 toothpick and replace the cache.

Practice Site
Coordinates:
Clue:

Site 1
Coordinates: Toothpick Color_____
Clue:

Site 2
Coordinates: Toothpick Color_____
Clue:

Site 3
Coordinates: Toothpick Color_____
Clue:

Site 4
Coordinates: Toothpick Color_____
Clue:

Next Step

Create a map of the invasive species on your school campus by downloading the waypoints onto a Google Earth image. The Google Earth user guide can be found at http://earth.google.com/support/bin/static.py?page=guide_toc.cs2

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Investigating Science at Home

Meagan Musselman and **Lynn Patterson**
Murray State University

If students aren't learning from the way that we teach, then we need to teach them in a way they learn.

develop their activities they will want to include the Framework of the NGSS through: *Science and Engineering Practice, Crossing Cutting Concepts, and Disciplinary Core Ideas* (Conceptual Shifts in the Next Generation Science Standards, 2012).

The framework for the Next Generation Science Standards includes science and engineering practices. These standards focus on planning and carrying out science investigations as well as analyzing and interpreting data. Home science investigations provide everything a family needs to help foster science learning with their child at home while reinforcing standards and content that the teacher is teaching in the classroom. Careful planning and preparation is required to create this unique version of differentiated learning for your students and through their own families. Additionally, Jones and Jones (2013) report that parents are more likely to support teachers if they understand, and feel a part of, what goes on at school. *Investigating science at home* is the perfect avenue for positive parent support and involvement.

Time Constraints

Time constraints in the classroom often prohibit the explorations necessary to produce answers to the question, "I wonder what would happen if…" that is prominently heard from students conducting science inquiries. Science is cyclic in nature; one question leads to an exploration that yields both an answer and more questions. Home investigations are naturally interactive for families and students, and help provide an authentic experience in constructing knowledge. It is common for families to continue the investigations and the conversations that stem from the discussion of the investigations weeks after the materials are sent back to school. The home investigations help families open the science students' eyes to the phenomena of how the world around them works.

Teachers should carefully plan and develop investigations that relate to the content to be explored and learned throughout the year. This is not a restraint, because investigations can be developed and used as a way to remediate students on certain skills or concepts, and they can also be used as an extension for students who are ready for more challenging concepts or skills. In this manner, differentiation is provided for all student learners. Forsten et al. (2002) remind us that if students aren't learning from the way that we teach, then we need to teach them in a way they learn. Parents can serve as a vital member of our learning teams for every student. The teacher will use discernment as to which investigations are most appropriate for each student. Planning and organization becomes extremely important, but home science investigations can provide the extra time needed on concepts that the classroom cannot provide.

Steps to Science Investigation Implementation

The following steps are suggested as you prepare parents and students for home science investigations:

- Discuss home science investigations with parents at the scheduled parent orientation. At this meeting the teacher will explain how science

Introduction and Background

Science provides us with knowledge about the physical world around us. To better experience science, upper elementary grade teachers (third through fifth) can remove the confines of the traditional classroom - the four walls and time-constraints of the day - and help students investigate science at home. Science demands the freedom to explore and construct knowledge outside of the traditional classroom instruction. Families provide the perfect opportunity for students to foster and expand their scientific inquiries. According to Copple and Bredekamp (2009), children learn and develop best when they are part of a community of learners - a community in which all participants consider and contribute to one another's well-being and learning Families can serve an essential role in that learning community. Teachers can help equip parents with the knowledge, skills, and sometimes materials necessary to conduct science investigations with their children at home. Teachers can share the joy of science learning with parents and students as they prepare the next generation of science learners and problem solvers.

Benefit of Involving Families

There is great value in having families involved with student learning. Henson (2010) found in his research of effective schools, that parent involvement is directly linked with academic success. Not only are families able to learn together, but parents are modeling their own children's learning by exploring and discovering information. The cooperative nature of home science investigations, that we will discuss later, leads to increased student engagement due to the intimate setting of a family working together. These investigations provide multiple opportunities to explore, problem solve, and often wrestle with possible explanations. They provide a means for families to discuss and discover science.

Piaget, representing the *interactionist, developmental,* and *cognitive perspectives,* stated that students need to have an active part in their learning, and they need to interact with each other and the environment (Wink & Putney, 2002).

Home science investigations provide a means for students to take ownership of their learning. They are not in front of a teacher trying to convince them of the content they have mastered - they must convince themselves instead.

Furthermore, Vygotsky said that the acquisition of new concepts is most meaningful to students when they are given an opportunity to construct their own knowledge and to discover things for themselves (Wink & Putney, 2002). By equipping families to work with their children, teachers are able to create a non-threatening environment where students feel more comfortable exploring. They won't be intimidated or embarrassed by peers for not knowing the answer to a question. In many cases, the students may take on the role of facilitator of the investigation in their families. They are not only learning by doing, but also learning by teaching and explaining to others.

Meeting Next Generation Science Standards Through Home Investigations

Although home investigations are meant to involve families in the science learning process, students also develop independent learning skills for life. The exposure to this type of instruction allows student ownership of their learning. Student learners are not in front of a teacher trying to convince them of the content they have mastered - they must convince themselves instead. By involving families in this process, home investigations are able to meet the needs of all learners. Home science investigations may indeed be one way that we can differentiate and meet the needs of all learners. As teachers

Students and Parents together write or draw what they learned, what they noticed, and what they liked

We learned …	We noticed…	We liked…

Students and parents together write the positives, negatives, and the interesting facts about the science investigation

Plus	**Minus**	**Interesting**

Students with their parents compare and contrast their thoughts on the results

Student	Parent

Students and parents complete a KWL chart about the investigation

We know	**We are wondering**	**We learned**

Figure 1: Formative assessment for a science investigation performed at home.

investigations will be sent home to be completed and then returned to school. Optional: Host a family science night in the fall to launch this family/home connection.

- Prepare your home science investigations and assessments in advance. Designate an area in the classroom for storage, check-out, and return. Develop a kit with all items needed for the investigation. Optional: Teachers may choose to post procedures for the interactive science investigations on their website. A video demonstration can also be provided. Additionally, sending home a DVD for English language learners' parents and students to view can also be helpful. Also, consider providing a place for parents to post their comments on your website.

The *pitch* and communicating *what's in it for parents and students* will be important. Motivation should be high to encourage home participation. Be honest and transparent as you explain the benefits to parents. If possible, share a video recording of a student and parent completing a home science investigation together. Consider having a parent give a testimonial about his or her experience at the meeting. Post this testimonial video on your website. Be prepared to answer questions and allow parents an opportunity to give input.

- Provide a clear schedule for home science investigations for students and parents. For example, an investigation will be sent home every two weeks. However, because of limited supplies, investigations may have to be sent home on a rotating basis. This means that not all students would be working on the same investigations at the same time.

- Investigation directions need to be in folders, and the necessary materials should be provided in sealable plastic gallon bags. An assessment form should be provided, and parents should be instructed to return it to school upon completion of the investigation. Figure 1 shows several formative assessment samples. These samples include different ways of allowing students and parents to document their observations and thoughts about the investigation. When the investigation kits are returned to school, the teacher will read the responses the student and parent provided on the assessment form. Feedback needs to be provided and returned home so that the students and parents can process the information in a timely manner.

- Investigation folders can be color-coded to go with the area of the science investigation.

- Include science safety instructions with every investigation. These should be printed on bright colored paper and laminated for durability. Provide safety equipment when applicable. For example, students may need goggles, aprons, or gloves for an investigation. Additionally, be sure parents understand that they must experience the home investigation with their children. They will provide supervision for particular investigations that may require students to be supervised for safety purposes.

Science Investigation	**Materials in Kit**	**Student's Name**	**Date Out**	**Date In**	**Assessment Completed**	**Assessment Returned to Student**
Volumania! (A)	100 ml graduated cylinder					
Volumania! (B)	100 ml graduated cylinder					

Figure 2: Home science kit sign-out sheet.

Parents get to interact with their child as a learner and they get to participate in one-on-one conversation time.

investigations. Your investigations list will never be complete! You will find yourself continually adding more investigations. Here is a list of some science investigations that could get you started in forming your kits.

- Volumania! Using water displacement to calculate the volume of solid objects (Figure 3).

- Using a paper cup, string, and water, students can experiment with the different sounds made from the vibration of the string.

- Using paper, tape, and books, students can experiment with which shapes (round paper pillar, cube, and so forth) are the strongest. Using the same materials, paper and tape, students can demonstrate making a structure stronger simply by changing its shape and seeing how many books it can hold (Mandell, 1990).

- Demonstrate that carbon compounds are found in fruits by dissolving lemon juice in water and using a cotton swab dipped in the water to write a message on paper. After the message is dry, hold it to a lamp and the carbon compounds break down from the heat and produce carbon, which is black (Mandell, 1990).

- Literature and science connection. Use the book, *Zack's Alligator* (Mozelle, 1989), along with "growing alligators" that grow when added to water. Students can connect the adventures of Zack and his alligator, Bridget, by practicing their measuring skills as they chart the growth of their growing alligator. A complete kit with the book, activity guide, and growing alligators is available through Steve Spangler Science products.

- Other ideas are available through the Performance Assessment Links in Science (PALS) resource bank which is supported by the National Science Foundation (http://pals.sri.com).

Linking Students, Parents, and Teachers in Science Investigations

Home science investigations provide the answer to several problems teachers struggle to answer.
- How can I involve parents in their child's learning?
- How can I engage students with science content?
- How can I link content to real-world experiences?
- How can I differentiate instruction so that all students learn?

Implementing home science investigations is a way for teachers to extend the school day! Learning will continue at home during the evening and on weekends as parents work through the investigations with their children. The value of these experiences carries on after the materials and assessments are returned to school. Teachers strive to develop a love for learning within their

Volume Calculation Chart

Name of Object	Starting Volume (ml)	Ending Volume (ml)	Volume of Object (cm^3)

Figure 3: Volumania! data collection sheet.

- Keep track of who returns completed investigations and who does not. A sign-out sheet on a clipboard located next to the science kits is a very easy way of tracking this (Figure 2). Another proven method is using a wipe board with the investigations' names and materials permanently written on the board and that students can mark and erase when they've checked it out and returned it. Have a designated area for returning the investigations in your classroom. At that area, place a checklist of materials to be returned. Teachers can assign students, parent volunteers, or instructional assistants to help with this important task. The designated person can check that all materials are accounted for and that they are returned in their original condition.

students. Parents are motivated in multiple ways through these investigations. They get to interact with their child as a learner, help prepare their child for the next generation of problem solvers in science, gain insights into what goes on in their child's classrooms, and get to participate in one-on-one conversation time. The seeds that are planted by families conducting the investigations at home will blossom into thought-provoking conversations about the world around them.

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Note: Some materials that are sent home in the investigation kits will likely not be returned, or may be returned damaged or broken. Every effort needs to be made to include items in the kits that are durable and inexpensive.
- Offer support and accommodations as needed. Find out what you can do to support students and parents in the process. Follow up by directly contacting parents to see how you can make the process successful for every student.
- At the end of the school year, teachers should gather feedback from the parents. This feedback can include their thoughts and opinions on the clarity of directions provided for the investigations, the quality and timeliness of feedback received from the teacher, as well as suggestions they have for improving the experiences for the next year. That way you will be ready to make your investigations even better for the next school year.

Materials List

- Two-pocket folders labeled with the name of the science investigation (one for each science kit). Consider using color coded folders with the area of the science investigation. For example, Earth and space science (red), life science (green), engineering and technology (yellow), and physical science (blue).
- Gallon-size sealable plastic bags to hold associated kit items.
- Laminated copy of science safety procedures; one for each science kit.
- Laminated copy of investigation directions; one for each science kit.
- Multiple copies of the assessment form, placed in each investigation's folder.
- Check-out list for materials and kits that students have taken home, to ensure they are returned.
- Items for the kits will vary, but appropriate materials and safety equipment should be included that are tailored for each investigation. Every effort should be made to include durable items since they will be transported and handled often.

Ideas for Science Investigations and Cross-Curricular Applications

There are many wonderful science skills that can be practiced at home through science

Write for the *Spectrum!*

The quality of the *Spectrum* is directly proportional to the relevance of its contents to you, your practice, and your classroom. You can assist colleagues across the state by sharing your wisdoms and experiences. You will also gain from this opportunity.

- Obtain experience in publishing, and a citation for your resume or CV.
- Receive feedback from the educators across the state about your ideas.
- Participate in an endeavor that is central and key to science and science education - the communication of ideas and the sharing of knowledge! Information is most validated and honored when it is held up to peer scrutiny and shared.

Your manuscript should:

- Be submitted digitally, saved in Word format;
- Preferably, be less than 3000 words in length, but articles of substance of most any length will be reviewed and considered for publication;
- Include all authors' names, affiliations, email addresses, and a brief biographical sketch of three or four sentences;
- Include illustrations - sketches, photographs, figures, graphs, tables - when appropriate. These should be numbered and referenced in the text by figure or table number. Each illustration should be at the end of the document on a separate page, with title, caption, and legend (if appropriate), and not embedded within the text. Photographs should be jpg images, included as separate files. Illustrations should be of good composition, and high contrast. Any illustrations that the authors did not create and do not own need to be accompanied by permission to use the illustration and credit to the creator/ owner needs to be provided with the illustration and caption. Color images and illustrations are welcomed.
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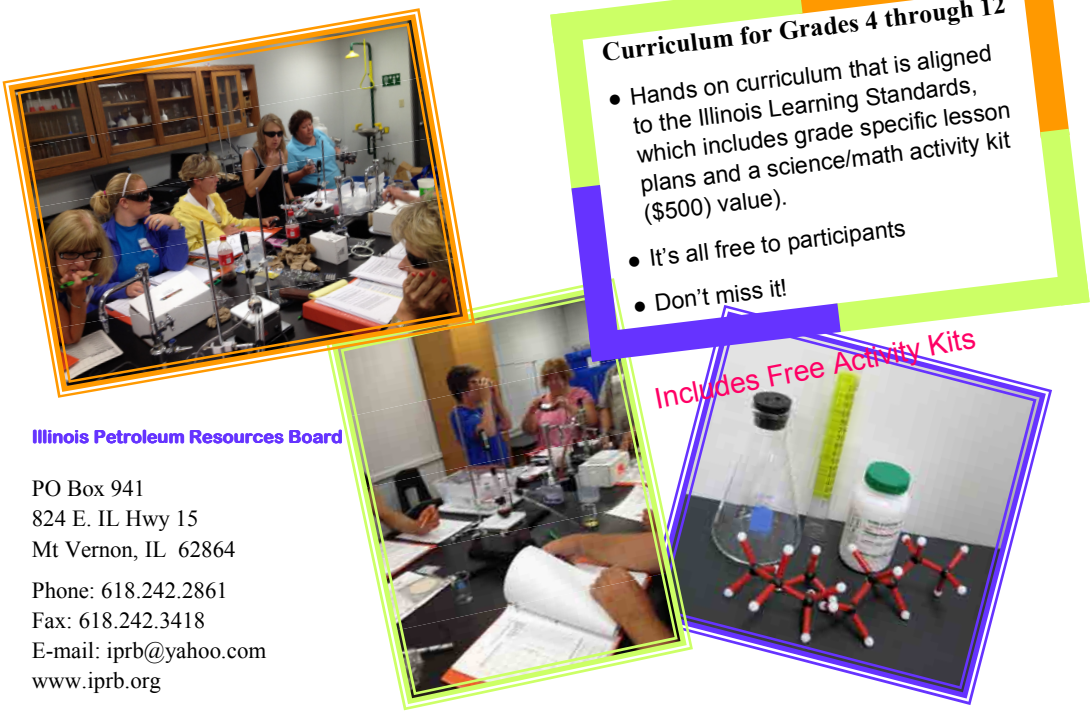

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E-mail: iprb@yahoo.com
www.iprb.org

Future ISTA/NSTA Conference Plans

(tentative)

2013 ISEC at Tinley Park Conference Center, Tinley Park, Oct. 24 - 26, 2013

2014 NSTA National Conference on Science Education in Boston, April 3 - 6, 2014

2014 STEM Forum and Expo in New Orleans, May 14 - 17, 2014

Fall 2014 Science Education Conference Southern Illinois

2015 NSTA National Conference in Chicago, March 26 - 29, 2015

National Science Teachers Association

National Conference on Science Education

nsta.org

Boston, Massachusetts

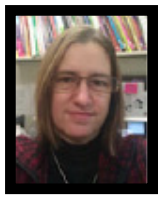
April 3 - 6, 2014

Regional Directors









Robin Wendy Dombeck	Carol Schnaiter	Don Powers	Kristin Camp	Liz Malik	Kathleen Gaare-Wiese	Jackson
Region 1	Region 2	Region 3	Region 4	Region 5	Region 6	Region 7
Barry	Courtney	Emily	Ken	Stephen	Fred	Hethyr