

C₃ BONDS

VOLUME 2, ISSUE 1

FALL 2003, YEAR 2



C₃ Welcomes Back Its Debut Group in June!

After experiencing a fantastic debut project during the 2002-03 academic year, the C₃ team enthusiastically welcomed the following teachers back to the Louisiana Tech University campus to begin the first Year 2 component of the National Science Foundation funded professional development project:



Jon Brinkman, Eunice High School
 Betsy Chism, East Ascension High School
 Todd Coble, Ouachita Parish High School
 Julie Dubois, Simsboro High School
 Mandy Dugdale, West Feliciana Middle School
 Bill Gallien, Fair Park High School
 Jane Hamby, Morehouse Middle Magnet School
 Cindy Hampton, Cedar Creek High School
 Samuel Johnson, Eunice High School
 Leslie McClure, West Feliciana Middle School
 Mary Beth McCoy, Ouachita Parish Junior High School
 Jamie McKenney, Mann Magnet Arts and Sciences Middle School
 Thais Mitchell, Fair Park High School
 Richard O'Neal, Crossett High School
 Sandi Prejean, Vanderbilt Catholic High School
 Lynn Prosen, St. Thomas More High School
 Tony Reliford, Booker T. Washington High School
 Stacy Thibodeaux, Lafayette High School
 Michelle Underwood, Chatham Jasper Henderson High School
 Lori Varner, Choudrant High School
 Emilie White, Quitman High School
 Missy Wooley, Rayville High School

The group spent the first two weeks of the summer engaged in studies that remained focused around concepts connected to the Hindenburg disaster. Topics included accuracy/precision, solutions, conductivity, acids/bases, physical and chemical changes, molarity/molality, and colligative properties among others. In addition, emphasis was placed on the history of science and key figures involved in the development of scientific information.



Participants engaged in hands-on/minds-on learning experi-

ences that involved use of the scientific method, experimental design, process skills, and inquiry. Various aspects of the science reform movement were discussed, modeled, and assessed as well as teaching strategies such as cooperative learning, learning cycle, alternative assessment, and constructivism.

The teachers now face the challenge of implementing what they learned over the summer into their classes during the upcoming academic year. In addition, they will be working with colleagues within their schools and districts as their focus shifts toward sharing what they have learned in the project. All indications are that everyone is off to an excellent start and each participant's hard work, dedication, and enthusiasm is not only evident, but really paying off. Thank you Year 2 folks!



STUDENTS SPEAK . . .

On September 9, 2003, a diverse group of students was assembled in Baton Rouge, LA. The 39 student panel from 8 different parishes joined forces during **teen chat** to formulate action items to improve the current education and workforce situation. Their top three positions were:



1. Enhance educators' teaching methods to be more effective and meet more learning styles
2. Incorporate more relevant career guidance into schools
3. Establish a medium for student input

Students want their educational experience to be as effective as possible. Career Builders already has the wheels turning to create an organization for student input into the educational process. But it is up to educators to tackle the first two items. All C₃ teachers are challenged to remain focused on the need to work diligently to provide the best possible learning experience possible for all students. Their future (and ours!) depends on it!!



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LEADING WITH THE LEARNING CYCLE



The C₃ Team is proud to salute the superb job its participants have done with implementation of the learning cycle. One of the major goals for the project was to focus on effective implementation of the learning cycle while developing strong conceptual knowledge. The teacher testimonials verify that the effort is paying off for them and their students. **Sandi Prejean, Vanderbilt Catholic High School**, shared that "the most significant by-product of the program has got to be the higher ACT science reasoning scores of my students from the start of the year until the end. Another important factor is how these methods are encouraging my students to participate in science activities outside of school." **Jamie McKenney, Mann Middle Magnet School**, indicates that "the students enjoy the learning and they learn the concept instead of just covering it." **Leslie McClure, West Feliciana Middle School**, states that "all teachers should use the learning cycle—it just makes sense". This sentiment was echoed by many of her colleagues, including teammate **Mandy Dugdale** who reports that she "tried to use the learning cycle with every lesson" she develops. **Julie Dubois, Simsboro High School**, reports that the learning cycle really "helps teachers organize their lessons into a logical order." **Samual Johnson, Eunice High School**, says that the learning cycle allows "the students to have more control of their learning than ever before." He believes this gives credence to the adage "The student is responsible for their own learning." **Lynn Prosen, St. Thomas More High School**, echoed that idea by



reminding herself and others that "whoever does the work, does the learning". She even went further by stating "What point is there in memorizing everything I tell them if they never internalize it?" **Cindy Hampton, Cedar Creek High School**, shares that she is "a fan of the learning cycle lesson format and in fact, rewrote all of her lessons this summer using the learning cycle." She includes that "the students are more actively involved in the material." **Emilie White, Quitman High School**, was so enthusiastic in explaining the impact of the learning cycle in her classroom to her principal that she was immediately drafted to demonstrate a model learning cycle lesson for her school's faculty! **Missy Wooley, Rayville High School**, offers this powerful testimonial about the power of the learning cycle: "one of my students from last year is attending Tulane on a legislative scholarship. He is one sharp cookie. He e-mailed me to thank me for the way I taught him chemistry. Last year he was in my guinea pig group; I was trying to get my feet wet with the learning cycle. He told me that he is having to tutor students who passed the AP chem test because he actually understands the concepts and they just know the facts. You don't know how excited I was to hear this. His affirmation reassures me that the LC is the only way to go. He is having no problems with the labs (imagine that, we did tons of handson/minds on activities) and he is an "in demand" lab partner. He says the labs are cookbook easy labs compared to some of mine. I think my confidence just went up a couple of notches!" And that seems to sum it up. Thanks to our C₃ teachers for working so hard at something that works!



C₃ Gets Back on the Board!



C₃ teachers are once again engaged in a highly interactive on-line learning community through Louisiana Tech's Blackboard system. Used as a communication tool, the online component of the program serves as a means of support for the C₃ teachers as they work toward fully implementing the learning experiences and strategies shared during the summer program. In addition, it is highly effective as a means of maintaining the sense of community that was established during the summer program and facilitating the on-going instruction of the group. The Year 2 participants have al-



ready jumped in and are burning up the keyboards! The first assignment focused on their growth with the learning cycle and posted a record setting 304 responses. Currently 85% of the group has completed the first assignment and 45% have moved on to the second topic dealing with each teacher's collegial coaching experiences. Cathi Cox, Program Site Coordinator, appreciates the excellent job the teacher's have done with the electronic learning community and challenges Year 2 not to let Year 1 show them up! Visit the Tech Blackboard site at <<http://blackboard.latech.edu>> to continue the discussion, support, resources, and FUN!

GET READY CRESCENT CITY—C₃ IS COMING!

C₃ is delighted to once again be able to offer the opportunity for its teachers to attend and participate in the 2003 Louisiana Science Teachers Association Convention, "CSI :New Orleans". Held in New Orleans, December 4-6, 2003, short courses will be offered the first day with breakout sessions and workshops following on the next two days. All C₃ teachers will be provided registration, two nights hotel stay, and a travel allotment in an effort to facilitate their attendance at this typically outstanding meeting. The C₃ team will be presenting an inquiry based session from its summer course on Friday while the CATALyST staff will offer a short



course on Thursday, with two other sessions on Friday: Pondering the Pen, a writing in science presentation, and Who Gets It and Why?, a life science experience. Then both C₃ groups, Years 1 and 2, will meet together on Saturday, the 6th, for a mandatory session from 9:00-12:00. It should be an exciting time of professional development as well as lots of fun for everyone involved as we experience the tastes and sounds of the Crescent City. We look forward to having the entire C₃ family together during this time and remind everyone to register and make room reservations ASAP in order to be ready when the convention begins. For more information, contact Cathi immediately and get ready for a road trip!



REMEMBERING THE REFLECTIVE REUNION



Year 2 C₃ participants kicked off the academic year program with a special one day session held on the Louisiana Tech campus Saturday, August 18, 2003.

Facilitated by Program Coordinator, Cathi Cox, the morning began with a series of leadership experiences that set the stage for each participant's role as a collegial coach. After having fun organizing themselves in teams of three, the teachers worked together through a critical thinking carousel, a communication card sort, and mock journal comments.

Each participant was then guided through an overview of the academic year collegial coaching program, which each teacher eagerly embraced. By the end of



the morning session, the group had strengthened its bond and resolve with a renewed dedication for the tasks ahead.

Before leaving the course in June, the teachers were once again challenged to develop a project that utilized the learning cycle and focused on a content unit from the physical sciences that would be covered in their classroom during the 2003-04 school year. The project was to include learning experiences that engaged the student, allowed an exploration phase, developed concepts, had an application component and assessment. During 3 hours of the workshop, Project Co-Directors Linda Ramsey and Bill Deese, along with team member



ELECTRIFYING ELECTROCHEMISTRY EXPLORATIONS!

The Year 2 C₃ gang gathered for its first full academic year weekend workshop on October 4-5, 2003, to engage in Electrifying Electrochemistry. Beginning with a candy bar relay that featured Chemistry jokes and riddles plus plenty of chocolate, the participants got things kicked off with their typical energy and sense of humor. The entire session followed the learning cycle and included the following learning experiences: Investigating Zinc Reactions, A Redox



Reaction Carousel, Electrifying Experiences With Fruit, Relative Reactivities of Metals, Making Chemicals From Electricity, Investigating the Corrosion of Iron, Electrolysis of Water, Galvanic Cell Construction, and Electrochemistry Card Sorts. Teachers worked in cooperative groups of three as they explored the concepts and developed standards based teaching strategies. During the last day of the workshop, the teachers enjoyed a pizza lunch together before individually sharing about their collegial coaching efforts as the school year got underway. The C₃ team appreciates the effort and time that the following teachers provided to make the weekend session such a success:

Jon Brinkman, Eunice High School
Betsy Chism, East Ascension High School
Todd Coble, Ouachita Parish High School
Julie Dubois, Simsboro High School

Mandy Dugdale, West Feliciana Middle School
Jane Hamby, Morehouse Middle Magnet School
Samual Johnson, Eunice High School
Leslie McClure, West Feliciana Middle School
Mary Beth McCoy, Ouachita Parish Junior High School
Jamie McKenney, Mann Magnet Arts and Sciences Middle School
Richard O'Neal, Crossett High School
Sandi Prejean, Vandebilt Catholic High School
Lynn Prosen, St. Thomas More High School
Tony Reliford, Booker T. Washington High School
Stacy Thibodeaux, Lafayette High School
Michelle Underwood, Chatham Jasper Henderson High School
Lori Varner, Choudrant High School
Emilie White, Quitman High School
Missy Wooley, Rayville High School
SUPER JOB EVERYONE!!



**C₃ YEAR 2 PARTICIPANTS
WORKSHOP WEEKEND #2:
MARCH 6-7, 2004**

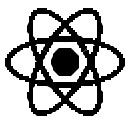


SPOTLIGHT ON C₃ SUCCESS



Jane Hamby, Morehouse Middle Magnet

School, engaged her students in the development of "Edible Atoms" using atomic fireballs for Dalton, peanut butter balls with M&M's for Thomson, and other types of candy for Rutherford and the nuclear models. She shares that the students had a GREAT time, learned ALL the parts of the atomic models, and especially enjoyed eating their work. Terrific! . . .



Cindy Hampton, Cedar Creek High School, has a new

lab! She now has group lab tables complete with access to water and gas, and all within her new "double" sized classroom. She reports that it is absolutely wonderful and she is so grateful to her administration for such support. C₃ is too! . . .

Lori Varner, Choudrant High

School, has increased her students' observation skills by adding a pet snake in the room! Talk about LONG term observations . . .



Julie Dubois, Simsboro High School, used the Gas

Law Scenarios as an assessment in her class and the students did an excellent job with both the drawings and explanations. Great! . . .

Mandy Dugdale and Leslie McClure, West Feliciana

Middle School, once again hosted the annual Science Shower for their science department and report that it was quite a success. They used "The Cooperative Cube" from C₃ Year 1 as the evening activity and received much needed supplies for their students to use throughout the year. They also share they the school has now provided a Science Closet for them to organize all the science supplies and materials they have accumulated. Way to go girls! . . .



Betsy Chism, East Ascension High School, shares that

card sorts have become so popular with her students, she devised a way to make it easier for her to construct them: prepare the card templates on the computer before running them on business card sheets through the computer. They are ready to go in no time! Thanks **Betsy** . . .

Sandi Prejean, Vanderbilt Catholic High School, reports that she's been working on using preassessments with her students in order to identify what needs the most attention. Great idea! . . .



Michelle Underwood, Chatham Jasper Henderson High

School, used "What's in the Beaker" with her students and they did a terrific job of developing rules from the objects provided. Super! . . .

Mary Beth McCoy, Ouachita Parish Junior High

School, modified "Molecules in Motion" so that her students did part of it as a hands-on/minds-on experience,



before she finished it as a teacher demonstration.

The students completed molecular level drawings following the learning experience and did a great job! **Jane Hamby** also did part of the experience as a demonstration before her students engaged in experimental design. Excellent! . . .



Todd Coble, Ouachita Parish High School, used a card sort on elements as a launching pad for his students to complete concept maps. Super! . . .

Missy Wooley, Rayville High School, developed a measurement and estimation carousel for her students to complete while studying significant figures. Great! . . .



Richard O'Neal, Crossett High School, shares that his Physics students are working on Rockercars as part of their velocity and acceleration study and will engage in a "pumpkin launch" later in the fall. Fun! . . .

Jon Brinkman, Eunice High School, will be working with two

of his students on monitoring water quality in

3 area streams. **Jon** shares that the stu-

dents attended Wiley College during the summer and this joint venture is part of their research. Exciting! . . .

As usual, the C₃ teachers continue to shine, as do their students. And as usual, we are proud of you! Keep up the excellent work!



More "GAS" Production

Lynn Prosen, St. Thomas More High School,

has started the "GAS" promotion within the Science Club on her campus. "GAS" essentially is "Great Achievements in Science"; the goal of the project is to promote success in science. **Lynn**



shares that awards will be presented for student achievement

in all the sciences, therefore involving all science faculty. For example, students who earn an "A" on a test will receive the "Sodium Award" with the thought being to name the awards for scientists and other science components. One idea she has is to present the "Darwin Award" for those students who have shown the greatest change over time. What an excellent idea! We look forward to **Lynn** updating us on the progress of this innovative new program. Tremendous!!

Congratulations to those C₃ teachers who are participating in Louisiana Tech's NSF GK-12 Teaching Fellows Project: **Julie Dubois, Simsboro High School**, and **Emilie White, Quitman High School**. We're proud of you and appreciate the impact you will have on the university science students you are working with!

C₃ Teachers Pave the Way With Professional Development

In addition to working hard in C₃, many of our teachers have been involved in additional professional development opportunities. **Mary Beth McCoy, Ouachita Junior High School**, and **Todd Coble, Ouachita Parish High School**, are participating in a special Integrated Science class designed specifically for Ouachita Parish science teachers and things are going great! **Sandi Prejean, Vanderbilt Catholic High School**, has established a contact at Nichols State University and has initiated meetings to bring C₃ to south Louisiana. **Sam Johnson and Jon Brinkman, Eunice High School**, have already organized a team to present a short course at LSTA in December. Terrific work everyone. No doubt you will have lots to share with your colleagues when you all get back together!



LOOK AT OUR LEADERS!

While attending the SEDL/SCIMAST Fall Forum in Little Rock, Arkansas, **Jamie McKenney, Horace Mann Middle Magnet School**, was selected to serve on the planning committee for the Arkansas Spring Forum. **Missy Wooley, Rayville High School**, has completed the LaTAP Assessment/Mentor Training and is currently engaged in working in that capacity. **Lori Varner, Choudrant High School**, and **Julie Dubois, Simsboro High School**, worked diligently on a Lincoln Parish team to develop system wide mid-term assessments for all students. **Jon Brinkman, Eunice High School**, has been tapped as Head of the EHS Science Department. **Richard O'Neal, Crossett High School**, will once again travel to Fayetteville, Arkansas, for the BEST Robotics competition, "Transfusion Confusion". We are proud of the outstanding work that each of these educators continues to do to improve science education for their colleagues and students.



"DROP IN" DELIGHT! Cathi shares that while "running" the roads to deliver classroom supplies and make teacher observations, there have been times when communications have gotten crossed and she has unexpectedly caught some C₃ teachers off guard. The good news is, in EVERY case, not only have the teachers been prepared and ready, but they were actually using C₃ learning experiences and strategies. WAY TO GO GANG—YOU ARE AWESOME!!

CONGRATULATIONS

C₃ congratulates **Missy Wooley, Rayville High School**, on being named not only RHS Teacher of the Year, but Richland Parish Teacher of the Year as well. Well deserved, **Missy!** **Sandi Prejean, Vanderbilt Catholic High School** is in the running for LSTA High School Science Teacher of the Year while **Stacy Thibodeaux, Lafayette High School**, has been tapped for the Essie Beck Rising Star competition. Good luck ladies! **Jamie McKenney, Horace Mann Middle Magnet School**, received a mini-grant from the Arkansas Science and Technology Authority to purchase consumable materials for her lab. **Jamie** credits her professional development with the ability to achieve this, but hats are off to her and her unique skills. We are proud of the outstanding work of ALL these fantastic C₃ participants!



WE DO EXTRA CURRICULAR, TOO!!

When not exciting students in their chemistry labs, C₃ teachers are also engaged in the lives of their students outside the classroom. **Missy Wooley, Rayville High School**, sponsors the Science Club but has added teaching after school aerobics classes (and getting her scuba diving certification!) and advising Yearbook this year as well. Also heading up Yearbook duties are **Jane Hamby, Morehouse Middle Magnet School**, and **Michelle Underwood, Chatham Jasper Henderson High School**. **Michelle** has also been tapped to sponsor 4-H, Senior Beta Club, and Jr/Sr Prom! **Tony Reliford, Booker T. Washington High School**, spends all his extra time either on the football field or in the gym. While a veteran football coach, **Tony** has also been handed basketball coaching duties this year. **Sam Johnson, Eunice High School**, also double duties with football and basketball while **Jon Brinkman** joins him as part of the EHS football staff. Looks like the C₃ crew is in for another busy year in ALL areas of school life!

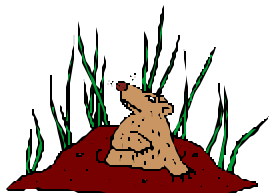


EUNICE HIGH SCHOOL SCIENCE CLUB GETS BACK TO THE PRAIRIE

Jon Brinkman and **Samual Johnson**, **Eunice High School**, share that their Science Club has engaged in a joint venture with the Cleco Corporation and the Cajun Prairie Restoration Society to restore 14 acres in Eunice to its original condition as a prairie. A \$2500 gift from Cleco got the ball rolling while Acadia Power Partners, a 50-50 partnership between Cleco and Calpine, donated the land to be used. Located on LA 13, just south of Eunice, the future home of the Prairie Restoration Park was dedicated during a special ceremony in September. **Jon** and **Sam** indicate that almost 100 years ago, a wildflower strewn prairie stretched across more than 9 million acres from Opelousas to beyond the Texas border and the City of Eunice still calls itself the Cajun Prairie Capitol. Today that prairie exists only in a few small isolated patches, mostly along old railroad right-of-ways; all the rest of it has been plowed up for farms. But with the generous gift from Cleco, the reseeding efforts can begin immediately to rebuild the historic prairie. Cleco indicated that they “are planting the seeds both literally and figuratively to restore this very important part of our heritage”. Everyone agrees that the project just makes sense and is a “win-win” situation for everyone. Eunice High School students have been working with the Cajun Prairie for at least 10 years now. **Jon** reports that you give the kids a shovel, let them get dirty, and they love it! And once the prairie is fully established, it will be self sustaining. Twenty years from now, the students will be able to look back on a beautiful, restored prairie and say “We did that”. What a wonderful legacy to leave. Great work **Jon, Sam, EHS**, and its students. You make us all proud!



MOLE MADNESS: OCTOBER 23

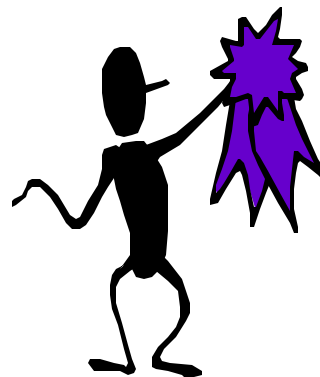


Will you and your students plan anything special for Mole Day, 2003? C₃ would like to know! Let Cathi know how you and your classes celebrate Mole Day and you could win a fabulous prize. The deadline for submissions is November 1, 2003. And don't forget to share all the festive details; your plan may be copied by others next year!

NEED OR WANT A PUPPY? **Michelle Underwood** has 9 new additions that are looking for a good home. She shares that the pups are “3/4 black lab, 1/4 traveling salesman”. If you are interested, let her know as soon as possible. E-mail: bubbles71226@aol.com



**“TO GIVE ANYTHING
LESS THAN YOUR
BEST IS TO
SACRIFICE THE
GIFT.”**



Steve Prefontaine
(World Class Runner)



**HAPPY
HALLOWEEN
FROM YOUR C₃
GHOSTS AND GOBLINS!!**



BULLETIN BOARD

Annenberg/CPB Offers Free Professional Development
http://www.learner.org/about/news/news_profdev.html#science
The Annenberg/CPB Channel offers free professional development and instructional programs for K-12 teachers of science. Topics include Learning Science Through Inquiry, Private Universe Project in Science, Reactions in Chemistry, and the Science in Focus series. Participants can earn certificates for in-service and recertification credit, or graduate credit at reasonable cost. Register now at 1-800-LEARNER or Channel@learner.org to receive free support materials.

Focus on Lesson Study
Eisenhower National Clearinghouse
<http://www.enc.org/features/focus/archive/lessonstudy/>
The Eisenhower National Clearinghouse (ENC) weekly online feature, Focus, provides information on lesson study for K-12 educators. Topics include Improving Learning, Teachers' Perspective and Collaboration. The site also includes additional articles from the National Staff Development Council, among others, as well as additional resources from the ENC catalogue.

NATIONAL MOLE DAY IS OCTOBER 23; MARK YOUR CALENDAR AND CELEBRATE!
Check out <<http://moleday.org>> as you make your preparations!

Enter the Team America Rocketry Challenge
<http://www.rocketcontest.org/>
The Aerospace Industries Association (AIA) and the National Association of Rocketry (NAR) are sponsoring the second national model rocket competition for U.S. high school and junior high school students. Teams must design, build, and fly a model rocket carrying two raw eggs to exactly 1250 feet. The top ten teams will share a grand prize pool of over \$50,000 in cash and savings bonds. The finals will be held on May 15, 2004 at Great Meadow, The Plains, Virginia. Applications must be postmarked by November 15, 2003.

www.coolcosmos.ipac.caltech.edu --- This site is all about infrared. There are activities, videos, images, background information, etc. Not only is it great for you, but it is also great for your students. There are LOTS of things for them to do!

Looking for interactive multimedia simulations? Check out www.ExploreScience.com

Explore the NWREL Science Inquiry Model
http://www.nwrel.org/msec/science_inq/index.html
The Northwest Regional Educational Laboratory (NWREL) Mathematics and Science Education Center created a science inquiry model to help k-12 teachers introduce inquiry into their instruction and curriculum. The model includes standards-based classroom tasks, a scoring guide for assessing students' performance of the essential traits of inquiry, and an intensive professional development component. The site also includes a primer on science inquiry, teaching strategies, additional resources and links to external sites.

New forensic science units are now available online, and they are FREE! Developed by Court TV in cooperation with NSTA, these units can help you bring this hot topic into your classroom today. To view units visit: http://www.courtstv.com/forensics_curriculum

A new website designed by TERC, the Space Science Institute, and NASA's Jet Propulsion Laboratory brings the adventure of the Mars exploration to any computer with an Internet connection. MarsQuest Online (www.marsquestonline.org) contains 34 interactive experiences that highlight interesting Martian features and take up compelling Mars questions. The site also serves as a portal to Mars information, images, data, and resources. Check it out!

Lego produces easily used robotics kits. PITSCO is the official distributor for educational Lego products. Contact them at 1-800-362-4308 or www.plestore.com *Robolab* (P900062-012) is the software used for programming the robots; the *Team ChallengeSet* (P979794-009) contains a variety of sensors, motors, Lego parts, and programmable RCX bricks in a carrying case.

Did you know you can enhance your lessons with 20,000 video clips—RIGHT NOW!?! Louisiana Public Broadcasting is now providing teachers with *unitedstreaming*—a web-based digital video delivery system from United Learning. Log on to the LPB-*unitedstreaming* web site with your own user name and password and search for the video title you wish to view. Choose to stream the video clip or you can download it for later use; view segments or an entire video. Visit: www.unitedstreaming.com

The 9th Annual "Sharing the Vision" Environmental Education Symposium is scheduled for February 27-26, 2004. Exhibits and sessions will be held at the Holiday Inn South, 9940 Airline Highway, Baton Rouge, LA. For more information or to present as session, call 1-877-523-6833.

Don't Burst Your Bubble!

Overview

This learning experience is designed to allow students to work cooperatively to design and conduct an experiment. When given a particular set of materials to use, groups will brainstorm to develop a method for determining which brand of dishwashing liquid produces the greatest amount of bubbles. The groups will share their ideas and, guided by the teacher, they will determine a common method to be used by everyone when conducting the experiment. (Or, as the teacher, you may choose to allow each group to use their own method.)

Actively conducting the experiment provides review and practice for the scientific method. By taking an active role in designing and carrying out the experiment, identifying variables and constants, gathering, sharing, and analyzing data, and reporting conclusions, the students are facilitating their own learning.

Don't Burst Your Bubble!

Designing a Controlled Experiment

Teacher Page

Description: The students will design and conduct an experiment to determine which brand of dishwashing liquid produces the greatest amount of bubbles.

Materials per Group:

4 medicine measuring cups with 5 ml samples of the four brands
12 quart size "ziplock" bags thermometer
graduated cylinder source of water
4 dropper pipettes ruler
stop watch

Procedure:

1. Prepare a tray of materials for each group.
2. Assemble the class into cooperative groups and assign roles.
3. Pass out group sheets and have materials managers pick up prepared trays.
4. Explain the learning experience and allow time for groups to brainstorm possible procedures and ways to set up charts and graphs.
5. Have groups share their ideas and guide them in developing a standard procedure that all groups agree to use. Identify the constants and decide the number of replications at this time.
6. Tell the groups to write the steps to the agreed upon procedure on their worksheets and complete the sheet before beginning the experiment.
7. Allow time for experimentation, data collection, analysis, and graphing.
8. Provide a class chart for the display of each group's data.
9. Call on the members of each group to report their results and share the graphs they constructed. Use this time to review proper graphing techniques.
10. Show an example of how the experimental design and data could be presented on a project board.

Summary: This learning experience provides students with an excellent opportunity to review and practice science as inquiry. By taking an active role in designing and conducting the experiment, gathering and sharing data, and reporting conclusions, the students are facilitating their own learning. It also gives the students reasons to communicate effectively and work cooperatively, thereby focusing on real world skills.

Don't Burst Your Bubble!

Designing a Controlled Experiment Student Sheet

You have been given four brands of dishwashing liquid and a set of materials. Your group is to design and conduct a test to determine which of the four brands produces the greatest amount of bubbles under the experimental conditions. You must design and perform the controlled experiment with the appropriate number of replicates (at least three) to test the effect of the chosen variable (brand) on the amount of bubbles produced. Before you begin, you should state your hypothesis and identify the independent (manipulated) variable, the dependent (responding) variable, and the constants (controlled variables). The data you collect should be recorded in an appropriate data table or chart of your own design (**placed on the back of this sheet**) and analyzed by preparing an appropriate graph. Your group will present your experimental design, data, graph (and its interpretation), and report any conclusions that you have reached.

Planned Procedure:

Hypothesis:

Independent Variable:

Dependent Variable:

Constants:

Create a data table to collect the data from each cooperative group in the class. Rank the brands of dishwashing liquid from 1 to 4 using your group's data. The brand producing the most bubbles receives a 1, and the brand producing the least amount of bubbles receives a 4. Place a "check" above your group number if your group correctly hypothesized which brand would produce the most bubbles.