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FIELD NOTES

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SABES Massachusetts Department of Education

A Better Way to Teach Science

By Joan Keiran with Patricia Harcourt

In the past, a typical GED class in our program, the Adult Collaborative of Cape Cod for Education and Support Services (ACCCESS) would look something like this: students would read a page in the GED book, answer five questions, check to see if their answers were correct, and then discuss them. The topics and the content were all dictated by what was in the book, and that format for learning was simply the one that would be used on the GED test. Recognizing that this approach is not the most effective for most learners, the instructors for adult education programs on Cape Cod began thinking there must be a better way to teach science. To find out how, we embarked on a two-year collaborative experiment that radically changed the way we did science in our classrooms.

As a participant in the Partnerships Advancing the Learning of Math & Science initiative (PALMS), we came in contact with the Waquoit Bay National Estuarine Research Reserve (WBNERR). The goals of WBNERR are to protect the estuarine system, to conduct research, and to communicate their research to the public in order to promote science-based decision-making on coastal issues. WBNERR had received a grant from the Environmental Protection Agency (EPA) to carry out their educational work. Recognizing an opportunity for the two PALMS partners to work together, WBNERR joined ACCCESS in proposing an approach to teaching the science component of GED. Staff from both programs worked together to develop a

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Foreword

Speaking… reading… writing… math… NRS… accountability… GED… standards… funding… persistence… attendance… learner goals….So many concerns, so little time. Teach science, too? You must be crazy!

Well, crazy or not, I am also here to invite you all to blend a little science into your busy teaching schedules. And I'm going to tell you why.

Why incorporate science into adult basic education? Science can be an exciting content through which you can engage learners in literacy and numeracy as well as encourage critical thinking and problem solving. You don't have to do traditional lab experiments and you don't need expensive equipment. You don't have to know tons of science either. (I teach GED social studies but managed to avoid all history courses in college.) Science is about forming questions and problems and actively seeking resolution or solutions. The language and process of science is a context that permeates our daily lives: health, cooking, environment, weather, workplace safety, consumer issues, current events, and so on.

The study of science has value for its content (e.g., learning how to become and stay healthy) and for its process (formulating questions and figuring out how to answer them in a reasoned way). We all have a curiosity about the world we live in and a desire to know more. Adult learners are no different. Science is a broad content area that tickles our curiosity and invites us to observe, question, and explore through a process of inquiry or "doing science". And learning to apply the process of inquiry to resolve a problem is a good thing—a critical life-long learning strategy.

I also believe that as experienced teachers, you bring many instructional strategies to the classroom that are transferable to whatever content you are using to teach literacy and numeracy skills. Tapping into learners' prior experience, interests and strengths, posing engaging questions and encouraging students to do the same, and helping learners acquire the skill of finding appropriate information for reasoned decision-making are all strategies that will serve you well in trying out the science instruction waters.

Not yet convinced? You might want to put the Teacher's Guide that accompanies the most recent Massachusetts Science and Technology Framework for ABE on your summer reading list. But first, explore this issue of Field Notes. *Lenore (a self-described non-scientist) has put together an exciting collection of teacher writings, activities, and resources.*

We hope after reading this issue of Field Notes *you might be motivated to try some science in your classes—through reading an Abenaki story of creation, through dissecting a chicken wing, through gathering and analyzing local trash. Anything counts, if you make it.*

Judy Titzel

Field Notes Mission Statement and Editorial Policy

Mission

Field Notes is an adult basic education (ABE) quarterly, theme-based newsletter. It is designed to share innovative and reliable practices, resources, and information relating to ABE. We attempt to publish a range of voices about important educational issues, and we are especially interested in publishing new writers, writers of color, and writers who represent the full range of diversity of learners and practitioners in the field.

Field Notes is also a place to provide support and encouragement to new and experienced practitioners (ABE, ESOL, GED, ADP, Family Literacy, Corrections, Workplace Education, and others) in the process of writing about their ideas and practice. Editorial support is always provided to any writer who requests it. Teachers, administrators, counselors, volunteers, and support staff are welcome to write for *Field Notes*.

Our Funder

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Our Editorial Policy

Unsolicited manuscripts to *Field Notes* are welcome. If you have an idea for an article or wish to submit a letter to the editor, contact Lenore Balliro, editor, by phone at 617-482-9485, by email at <lballiro2000@yahoo.com>, or by mail at 44 Farnsworth Street, Boston, MA 02210. Submission deadlines for upcoming issues are published in each issue of *Field Notes*.

Opinions expressed in *Field Notes* are those of the authors and do not necessarily reflect the opinion of the editor, SABES, or its funders. We do reserve the right to decline publication. We will not publish material that is sexist, homophobic, or otherwise discriminatory.

Our Reprint Policy

Articles published in *Field Notes* may be reprinted in any publication as long as they are credited to the author and *Field Notes*.

Editor: Lenore Balliro
Layout: Heather Brack
Proofreading: Deb Liehs
Lou Wollrab

A Better Way…

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grant proposal that would support the integration of inquiry-based science into adult learning programs on Cape Cod. The proposal was accepted and funded by the Massachusetts regional EPA.

The First Year

During the first year, a series of science classes were developed and team-taught in two GED classes. The goals were to make these classes interactive, inquiry-based, and relevant to the students' lives, thus moving them away from dependence on GED test booklets. The content of the science unit, however, was carefully linked to science concepts presented in the GED test. It included five components and focused on groundwater, watersheds, water use, pollution, and water quality testing. Staff from WBNERR worked in the classroom with GED students and teachers to model teaching of science concepts and inquiry methods. Teacher-training sessions on single concepts were briefly introduced at the end of some ACCCESS staff meetings. At the end of the year, the entire teaching staff (ABE, Pre-GED, and ESOL) were invited to a day-long science training session based on the GED curriculum.

Lessons Learned: Year One

One of the most important realizations of the pilot year was that it will take a long time for instructors to feel comfortable with science topics in general.

The interactive approach was useful and effective, but we presented far too much science content in each class. The content needed to be more selectively presented.

It is of the greatest importance to address the goals of the GED students to pass the GED test. The program must serve the students needs. While GED students were excited about the science activities, they repeated that their primary focus was on *passing the test*. Students needed reassurance that the material was going to help them with the test. Teachers and students agreed that the critical thinking skills could be applied to passing the test, but they pointed out that the format of the science instruction did not match the GED test format.

Many adult learners and teachers have had no exposure to formal science classes or science methodology and often feel intimidated or insecure when science topics are presented.

It takes a long time and a lot of patience for a new idea to become part of a program. It's a good idea to start small and simple.

One of the greatest difficulties was the discomfort felt by teachers and students with science topics. The key to successful implementation of science topics is to help teachers and students recognize that their life experiences include science knowledge and that they use science everyday.

Year Two

In year two, ACCCESS received a grant from Adult and Community Learning Services at the Department of Education to participate in the development of science and technology curriculum frameworks.

The goal of the second year was to implement the pilot GED curriculum throughout the entire ACCESS program (ABE, Pre-GED, GED, and ESOL). We recognized that we were attempting nothing less than to bring about a paradigm shift among teachers and students. That is, we were shifting from the assumption that "science is irrelevant and too difficult for me" to "I can do science and I use science everyday."

We started with an all-day in-service workshop for teachers and included the following:

- Presentation of science concepts in the context of Cape Cod water issues.
- Methods for teaching science concepts using interactive materials, lesson plans, and materials for teaching the science concepts presented at the in-service.
- Extensive discussion on teaching the concepts to different populations of students.
- Instruction on classroom use of maps, newspaper articles, and other familiar materials with a science content.
- Demonstration and discussion of an analytical reading exercise useful for science topics.
- Information about and practice with Internet resources for Cape Cod water issues.

Having two ACCESS teachers from the pilot year present the first two activities helped increase the credibility of the project. They added practical advice and showed new teachers that bringing science into their programs was realistic and worthwhile.

Science Kits

One of the barriers in keeping teachers from doing science is the lack of materials. Many science activities require equipment for measuring, weighing, or comparing samples, and open-ended investigations benefit greatly from having

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a variety of materials available for testing students' questions.

With this in mind, the partnership created kits for teaching about local water issues. The kits could also be used in teaching a wide range of other science concepts. The kits contain materials for specific activities, such as groundwater models in clear plastic boxes, and many supplies for general investigations, such as graduated cylinders, funnels, and beakers. On the advice of ACCCESS teachers, topographical maps of each area hosting adult education programs, a GIS land-use map of Cape Cod, and reference materials and background readings were added to the kits.

The most popular materials during the first year have been the maps and reading materials. As teachers gain experience and familiarity with the groundwater models, salinity and density activities, and open-ended investigations, we hope more of the materials will be used regularly.

Handbook for Teachers

In order to produce an overview of content introduced in the partnership project, we developed a handbook of background information for teachers. The handbook presents concepts, terminology, and issues related to water use, watersheds, groundwater, coastal ecosystems, and human impacts on water quality. It can also serve as reading materials for classes.

Site Visits and Field Trips

Several classes made visits to the Waquoit site during the year. The visits included some formal class time with interactive presentations, discussions, and a tour of the facilities and lab at the research reserve. The site visits were positive for many reasons:

- Students' experiences and knowledge were elicited and incorporated as valuable additions to the presentations. Students were not expected to have any specific scientific knowledge to understand the research.
- Students saw that research sometimes takes place in the outdoors, in boats, and with instruments designed and built by a scientist from everyday materials based on what is needed.
- Students could see examples of the concepts they were learning in the context of the real world.
- Being honored guests in a professional setting focusing on serious research made students feel appreciated and privileged.
- Visits to sites where research is actively being pursued is a powerful motivator for student learning in science. The site visit also provides a source of discussion topics and examples to use in class for the rest of the semester.

Outcomes of Year Two

We learned that teachers would continue to resist presenting class sessions on water issues until they felt better prepared and had a deeper understanding of the materials themselves. As a result, the partnership is working to provide teachers with information about content and the process of science, a discipline that does not always produce right or wrong answers. We also learned that:

- Teachers are more receptive when adequately trained.
- Partnership with a scientific community willing to adapt to program needs is vital.
- Communication on the value of science and technology inquiry-based activities among staff is critical and has greatly improved as teachers become more comfortable using science.
- Accessibility to a site where teachers, as well as students, can participate in activities in a scientific setting where inquiry is encouraged has greatly enhanced the comfort level of students and teachers.
- Vignette writing requested by the Department of Education Science and Technology Group increased interest in science and made teachers more aware of how much science they were already teaching in their classes.
- Each teacher will have a different "best way" to use the materials.
- The partnership has been successful in communicating the importance of science in ABE and the practicality of including science on all levels. We have learned that a science program based on local environmental issues is flexible enough to provide a basis for science in a form that is useful to every teacher in the ACCCESS program.

Joan Kieran is a program specialist for the ACCCESS program at Cape Cod Community College. She can be reached at <jkeiran@capecod.mass.edu>.

Patricia Harcourt can be reached at Waquoit Bay National Estuarine Research Reserve, 508-457-0495, or at <www.waquoitbayreserve.org>.

Why Do Science?

From the Massachusetts ABE Science and Technology Curriculum Framework

"Science literacy should be useful in everyday ways, enhancing one's employment prospects and ability to make personal decisions. It should help citizens participate intelligently in making social and political decisions on matters involving science and technology. But there is more to it than that: Knowledge of science should–like great literature–contribute to the ability and inclination of people to ponder, on occasion, the enduring questions of human meaning–our origin, place in the universe and significance."

—In The New Quest for Science Literacy, by James Rutherford and Graham Down, 1995

In order to take an active and productive part in today's society, it is becoming increasingly important for everyone to be scientifically literate. Individuals and groups must be able to use scientific information and thinking processes to make choices, solve problems, engage in public discourse and debate about important issues of social concern, meet job demands, and share in the excitement and wonder that can come from understanding and learning about the natural world.

However, in adult basic education both learners and educators represent a very wide range of scientific literacy skills. Given the realities of the field and the multiple demands on teachers and learners, it is not realistic to expect that adult education classrooms will set achieving scientific literacy as a major goal. Yet we believe it is important to articulate the vision of what scientific literacy for all adults might look like because such a vision can have a profound impact on literacy curriculum design. The Science and Technology Curriculum Framework encourages teachers to include science inquiry in their literacy and numeracy curriculum for the benefit of all.

Vision of a Scientific Literate Populace

- Asks questions, and finds or determines answers to those questions derived from curiosity about everyday experiences.
- Uses the inquiry process to solve everyday problems.
- Is able to describe, explain, and predict natural phenomena.
- Reads with a understanding and healthy skepticism articles about science in the popular press.
- Has respect for the use of evidence and logical reasoning in making arguments.
- Recognizes the role of science and technology in political decision-making by identifying issues that require scientific reasoning.
- Expresses positions on social and political issues that are based on fact and sound reasoning.
- Responds critically and carefully to claims made in the name of science and technology by advertisers, public figures, organizations, and the entertainment and news media.
- Subjects his/her own claims to the same kind of critical scrutiny so as to become less bound by prejudice and rationaliztion.

The Massachusetts Adult Literacy Hotline

The Hotline is a statewide information and referral service. It serves adults who seek a basic education program, volunteers who want to tutor, and agencies seeking referrals for their clients.

The 2002 Series GED Science Test: What's Different? What's the Same?

From Center for Adult Learning Educational Credentials
<www.acenet.edu/calec/ged/test2002-A.cfm>

The 2002 Series GED Science Test, using the National Science Education Standards framework, asks candidates to select the best way to set up an experiment, interpret others' results, analyze experimental flaws, apply scientific conclusions to their personal lives, and use the work of renowned scientists to explain everyday global scientific issues. The questions on the 2002 GED Science Test are still multiple-choice. The 2002 Series GED Science Test has been revised in several major areas but has not eliminated subject matter covered in the 1988 series.

What Are the New Additions?

One dimension of the 2002 Series GED Science Test incorporates the National Science Education Content (NSEC) Standards of physical science, life science, and earth and space science (National Research Council). The content area of earth science has been expanded to include space science due to an increased focus on space science in grades 9–12. The test groups physics and chemistry into the content area of physical sciences in accordance with the NSEC Standards approach to these subjects.

A second dimension of the 2002 Series GED Science Test includes the NSEC Standards of Unifying Concepts and Processes, Science as Inquiry, Science and Technology, Science in Personal and Social Perspectives, and History and Nature of Science. The areas of comprehension, application, analysis, and evaluation used in the 1988 series of GED Tests have been integrated with the NSEC Standards. The 2002 Series GED Science Test contains an increased focus in environmental and health topics (e.g., recycling, heredity, prevention of disease, pollution, and climate), and an increased emphasis on science relevant to everyday life.

The 2002 Series GED Science Test has increased the number of single questions and decreased the number of passage sets, permitting a wider coverage of science topics. Half (50 percent) of the new GED Science Test questions are conceptual understanding questions; the remaining 50 percent are problem-solving questions. Test questions with graphic content have increased from 30 percent to 50 percent.

If you have a specific question about the GED Tests that is not answered on the Web site, please email <ged@acenche.edu>.

Parent Involvement Project

By Janet Stein <www.allfored.org>

The Massachusetts Parent Involvement Project worked with a team of museum educators to create hands-on science activities for families. Many of these activities would work well in adult basic education classes and family literacy programs. For more information, contact Joel Nitzberg, project director, at the Alliance for Education, 484 Main Street, Suite 400, Worcester, MA 01608. He can be reached at 508-754-9425.

Ways in to Science: The Massachusetts ABE Science and Technology Curriculum Framework

By Cara Anaam, Roxanne Heller, Joan Keiran, Ethel McCoy, Garrett Sullivan, Judy Titzel, Patricia Vorfeld

The following is an excerpt from the revised Massachusetts ABE Science and Technology Curriculum Framework. *For teachers interested in incorporating science into the ABE, GED, or ESOL classroom, this framework is an invaluable resource. You can get a copy at <www.doe.mass. edu/acls / frameworks>.*

Inquiry

One way of choosing and incorporating science topics into your teaching is by doing what scientists do — ask questions about what interests you, make observations and reasoned explanations, then collect and analyze data and information from a variety of sources, and finally draw conclusions and share them with others. This process is often referred to as the scientific method. Here we call it *inquiry*. Learning and practicing the inquiry process is fundamental to life-long learning. An important step in this process is to ask questions. This curriculum framework encourages both teachers and learners to pose a variety of questions.

Asking Questions

Asking probing questions is a tried and true teaching strategy. Teachers naturally ask questions of learners to encourage them to think deeply, articulate their interests, share their experiences, help clarify or expand understanding, or to become aware of their thinking. It is also important to encourage learners to ask their own questions. Routinely modeling the questioning process for students encourages skills for independent learning. Who, what, where, why and how are often the beginnings of questions and explorations.

What might it look like to use questioning as a jumping off point for building an interesting reading and writing activity or for choosing a curriculum topic that involves science?

Pathways in to Science

A learner's concern: A learner is distracted because her young daughter has been diagnosed with lead poisoning. Her teacher might ask any number of questions to determine what the mother understands and what she might want to know more about. The questions posed might look like this:

- What is lead?
- What were the levels of lead found in your daughter?
- How did the doctors determine the level?
- What is considered a safe range?
- Can lead be removed from a child's system?
- How do you think the lead got into your daughter's system?
- How can you prevent other children in the household from getting lead poisoning?
- What other questions do you have?

These questions and many others might lead to an inquiry into a variety of science topics such as lead poisoning, circulatory system, makeup of blood, where lead comes from, what it is used for, and so on.

An observation activity: On a lovely fall day, ask your learners to sit outside for 10 minutes and record what they see, hear, smell, feel. Invite them to think of questions that might arise as they are making their observation. When they have gathered back in the classroom, ask learners to share their questions and list them on a flip chart. Check in with the class to see if there are questions that they would like to pursue as a group, such as the following:

- Why do leaves change colors in fall?
- Where does the trash go that collects in the street drains?
- Why does the air by the marsh smell like rotten eggs?

Classroom sharings: Often questions connected to science and technology are naturally embedded in accounts of family events, cultural practices, children's schooling, etc., that are shared by learners in the classroom. For

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Ways in...

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example, from a learner's recounting of her family's tradition of baking "unleavened" bread for a particular holiday, questions to explore might be

- What makes bread unleavened?
- What are different ways to leaven?
- What's the difference between baking powder and baking soda? Between these and yeast?

And you are off exploring what happens to these different substances when you add water, when they are heated, when they are mixed with different ingredients with and without gluten, crossing over a variety of science concepts that include gases, elasticity, volume, acids and bases, etc. A possible activity to try comes from "Tons of Provocative and Socially Acceptable Things to Do with Balloons Under the Guise of Teaching Science." The directions invite you to put yeast, gelatin, and warm water in a soda bottle capped with an uninflated balloon and watch the slow expansion. You might try it with other leavening agents as well and see if there is a difference.

Class readings: You never know when a science or technology topic might appear in a novel, poem, or article that the class is reading. A well-placed question asked by the instructor can stir the natural curiosity of the class. One example from an ABE teacher is recorded below.

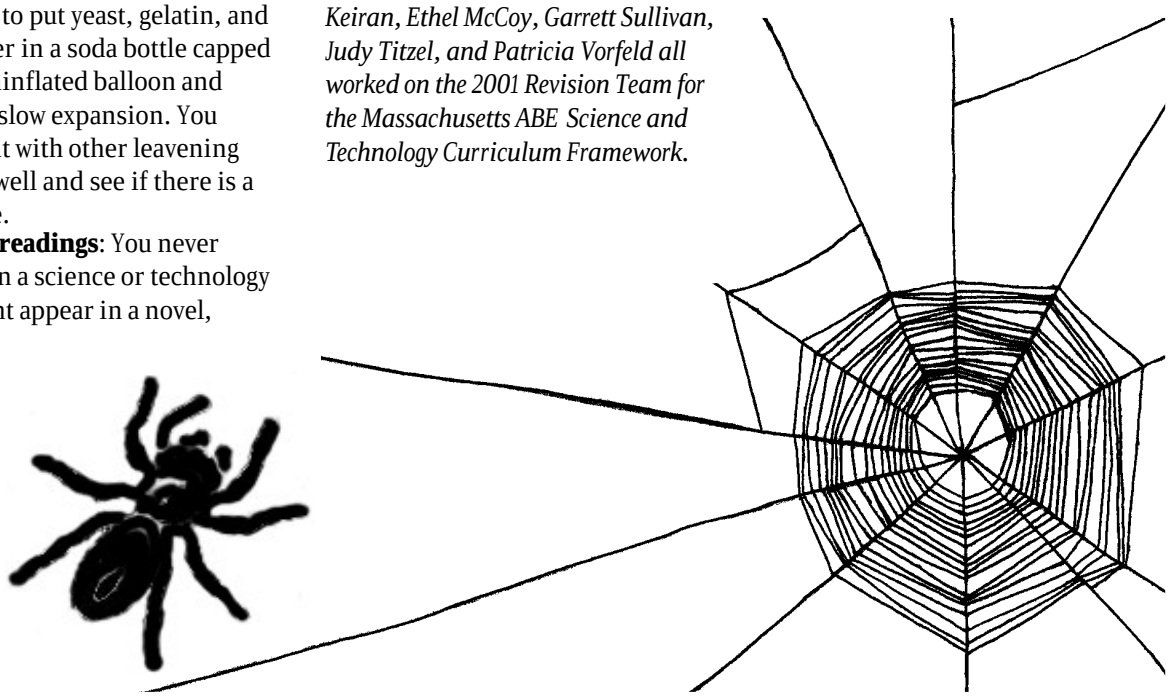
Developing Curriculum

You and your students are excited about exploring a topic or question that involves science. Now what? You could look up helpful information in the library, ask an expert, or search the Web. In addition, we recommend that one of the most effective ways to organize an instructional activity around exploring science questions or problems is first to turn to Strand 1: Doing Science & Technology/ Science & Technology as Inquiry and Problem Solving. The Learning Standards that accompany this strand outline the various activities of the inquiry process. And what is the inquiry process? An effective way to explore a question or solve a problem!

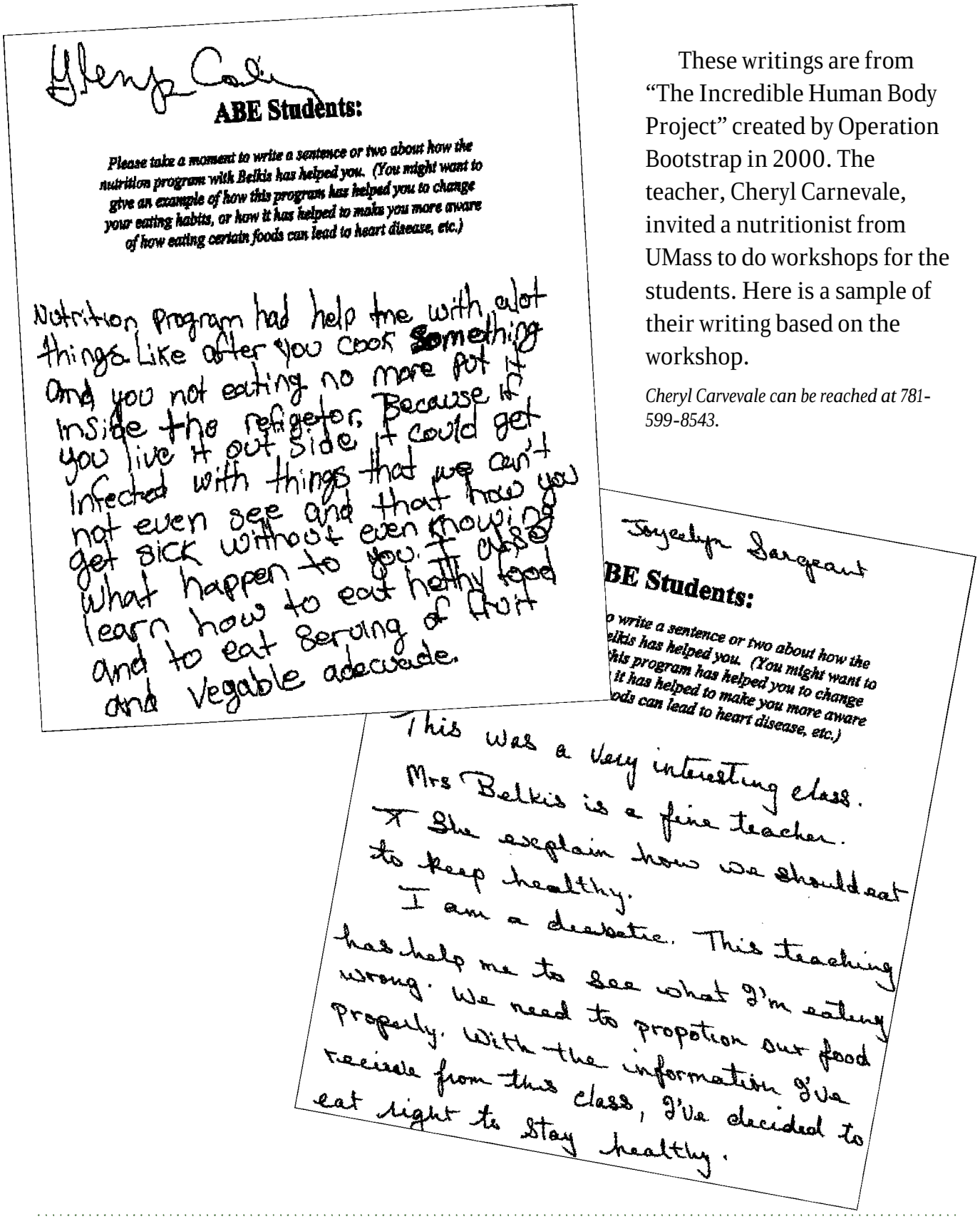
Cara Anaam, Roxanne Heller, Joan Keiran, Ethel McCoy, Garrett Sullivan, Judy Titzel, and Patricia Vorfeld all worked on the 2001 Revision Team for the Massachusetts ABE Science and Technology Curriculum Framework.

"At the time, there was a person from the South in the class who said she grew up with these same remedies. Her grandmother always harvested spider webs. Nobody was allowed to touch a spider in her house because of the healing qualities of the web. This led us into a study of old home remedies and folk healing. We did a study of penicillin because one of the students was convinced Tubman had discovered it. All this resulted from the literature we were reading! "

— ABE Teacher, Boston
From the Massachusetts ABE Science and Technology Curriculum Framework



Student Writing—Nutrition



Yleny Cole

ABE Students:

Please take a moment to write a sentence or two about how the nutrition program with Belkis has helped you. (You might want to give an example of how this program has helped you to change your eating habits, or how it has helped to make you more aware of how eating certain foods can lead to heart disease, etc.)

Nutrition program had help me with alot things. Like after you cook something and you not eating no more put it inside the refrigetor. Because if you live it out side it could get infected with things that we can't not even see and that how you get sick without even knowing what happen to you. I also learn how to eat healty food and to eat serving of fruit and vegable adecuede.

Joycelyn Sargeant

BE Students:

o write a sentence or two about how the elkis has helped you. (You might want to his program has helped you to change it has helped to make you more aware ods can lead to heart disease, etc.)

This was a very interesting class. Mrs Belkis is a fine teacher. She explain how we should eat to keep healthy.

I am a diabetic. This teaching has help me to see what I'm eating wrong. We need to propotion our food properly. With the information I've recieve from this class, I've decided to eat right to stay healthy.

These writings are from "The Incredible Human Body Project" created by Operation Bootstrap in 2000. The teacher, Cheryl Carnevale, invited a nutritionist from UMass to do workshops for the students. Here is a sample of their writing based on the workshop.

Cheryl Carvevale can be reached at 781-599-8543.

Short Takes

The Alphabet of Trees: A Guide to Nature Writing

Edited by Christian McEwen and Mark Statman
(New York: Teachers and Writers Collaborative, 2000)

This original and inspiring book, whose title is taken from a line in the William Carlos Williams poem,"The Botticellean Trees," offers a collection of essays about teaching nature writing, including field journals, fiction, poetry, and non-fiction. Readers will recognize contributors like poets Gary Snyder and Mary Oliver whose essays accompany the work of writers from a variety of disciplines. Some of the essays offer writing activities that strengthen empathy with living creatures in the environment; others help guide careful observation and description. This is an exceptional resource for teachers interested in the multidisciplinary possibilities of integrating science in the ABE classrooms.

Keepers of the Earth: Native American Stories and Environmental Activities for Children

Michael J. Caduto and Joseph Brushac
(Colorado: Fulcrum, Inc., 1988) Available at the Adult Literacy Resource Institute library, 617-782-8956.

This book has a far-reaching goal: to teach "respect and stewardship for the Earth and all living things." Joseph Bruchac, an Abenaki author and scholar of Native American culture, presents a retelling of traditional Native stories as catalysts for learning about the environment. Many guided activities help teachers plan follow-up lessons to the readings. Through this book, teachers and students can examine the difference between pre-scientific and scientific explanations of natural phenomena. To their credit, the authors do not shy away from moral issues as they explore environmental and social ethics.

Moon Journals: Writing, Art, and Inquiry Through Focused Nature Study

Joni Chancer and Gina Rester-Zodrow
(Portsmouth, NH: Heinemann, 1999)

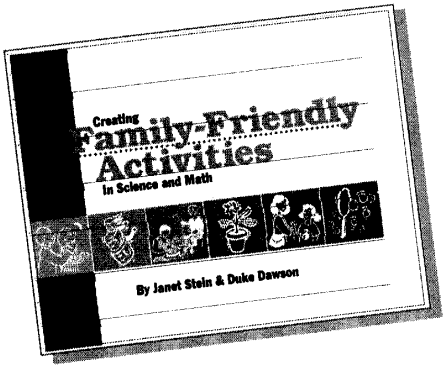
Exploring the natural world is an easy way in to scientific inquiry. *Moon Journals* is a multidisciplinary treasure of a book, inspirational for teachers who want to approach the study of nature in a creative and holistic way. The authors describe a moon journal as a "book of poems, a collection of stories, a set of facts, a gallery of art—an anthology of surprise." The two teachers who wrote Moon Journals draw on their own experiences in the classroom where they guided students in close observation of the lunar cycle for one month. Students recorded their observations and illustrated their moon journals, arriving at conclusions along the way. Though the authors worked with children, not adults, it's not too big a leap to adapt the approach to ABE.

Part one of the book presents an overview of the inquiry process that is key to successful observation and journaling. Students start with questions about the moon; for example, they might ask "Why do we see the moon during the day? Does the moon rise like the sun?" Part two contains art and writing mini lessons (called "invitations" by the authors) that teachers can draw from to develop workshops to help the observation and journaling process along.

Contemporary's GED Social Studies and *Contemporary's GED Social Studies Exercise Book*

Jeri Bayer and Kenny Tamarkin
(Chicago: McGraw Hill/ Contemporary Books, 2002)

A new GED Social Studies text from McGraw-Hill/ Contemporary Books has been written by two Massachusetts ABE practitioners: Jeri Bayer, curriculum and assessment coordinator at Northeast SABES, and Kenny Tamarkin, technology coordinator at Northeast SABES. This text also features a Change Agent article on environmental racism written by Silja Kallenbach at World Education.



Thank you for all the help, guidance and wonderful ideas you have provided. Families have responded eagerly to the events that involve them in science and math with their children.

Helen Franchi - Partners in Education for Athol/Royalston

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Creating Family-Friendly Activities Language Learning and Science: Teaching Science in an ESOL Class

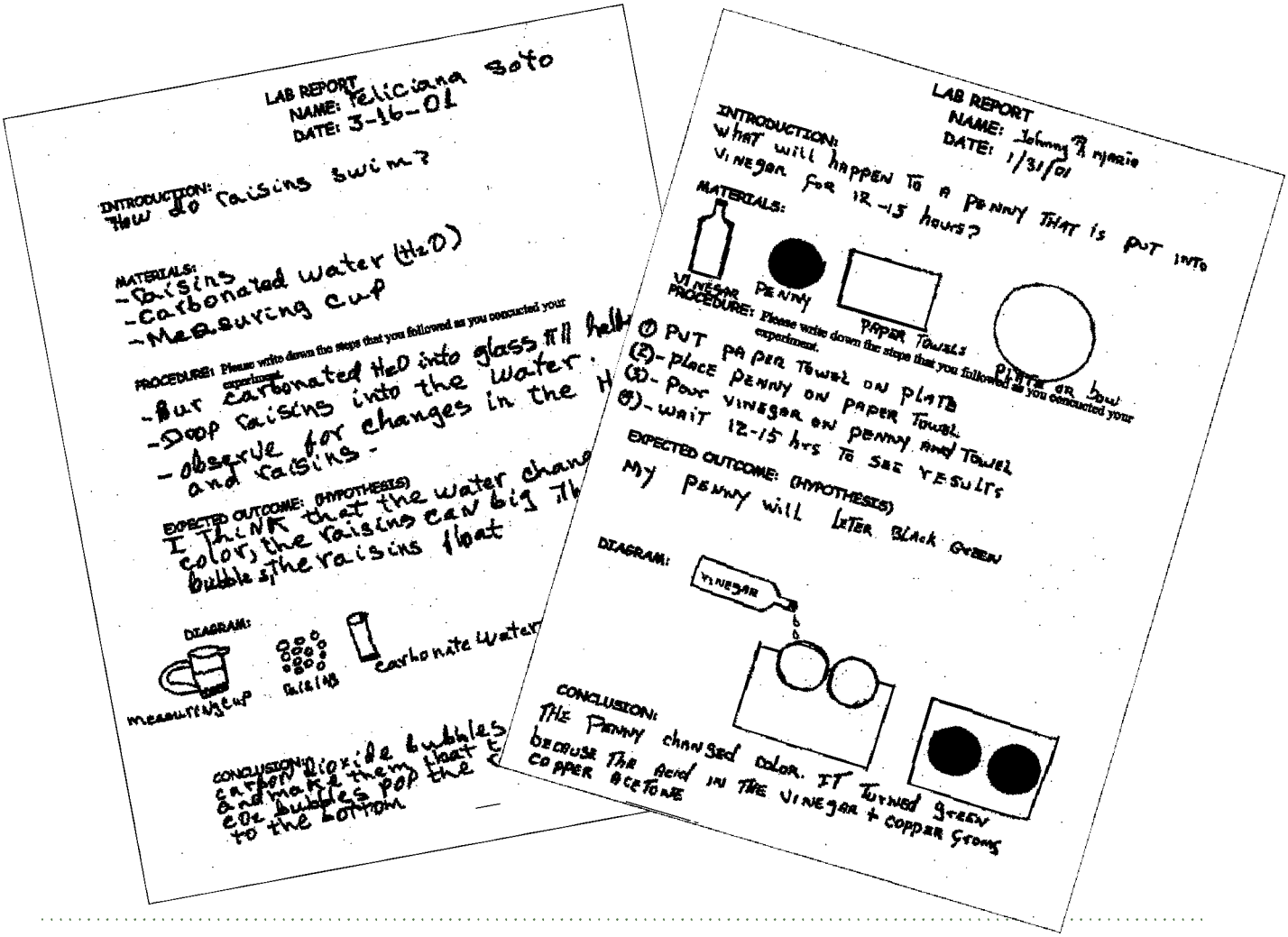
By Cheryl Bagley

We began our science unit by making booklets about nouns, adjectives, and verbs not related to science. We cut out pictures, labeled them, and pasted them onto colored pages to make small booklets. This led us into vocabulary (nouns, verbs, adjectives) about science. Each experiment contained vocabulary that may be unfamiliar. We used cards and placed each vocabulary word on it with the definition on the back. Then we hung them from the ceiling all around our room.

We worked through experiments with a partner. There are many simple experiments that can be done. The writing portion was difficult. I helped them complete their lab sheets. They actually did very well once they became familiar with the process. Each time a new student arrived we had to "teach" them all about our science project and lab sheet. This gave them an opportunity to "prove" that they understood the lesson. Needless to say, LOTS of time was spent on vocabulary and writing. Most of the ESOL students had never participated in science labs before this.

We presented our experiments at a science fair with all of our students. They really enjoyed it.

Cheryl Bagley teaches at Operation Bootstrap in Lynn, MA. She can be reached at 781-599-8543.



Tools for the Classroom

Meet and Potatoes

By Patti Vorfeld

Population: Any level ABE (can be adapted to ESOL)

Objectives:
1. To give learners the opportunity to meet each other.
2. To get an informal assessment on students' abilities to make observations and communicate in writing. Good observations help students raise questions, and this is where science starts!

Description: This has been a fun back-to-school activity.

1. Hand each student a potato. (Apples also work well.)
2. Ask students to look carefully at their potato and describe it, in complete sentences, as accurately as possible. Make available whatever tools you may have that will enable them to quantify what they see (e.g., rulers, string, etc.).
3. Exchange the descriptions among the students to see if they can find the right potato.
4. Finally, gather the class together to discuss what characteristics made the useful descriptions. For example, try to illustrate the usefulness of quantitative terms, like two centimeters in diameter, as opposed to vague terms like big or small. Accurate and clear expressions help people communicate.

Patti Vorfeld is a Pre-ASE (adult secondary education) instructor at Mount Wachusett Community College. She can be reached by email at <vorf@prexar.com>.

Healthy Heart Rate

Cheryl Carnevale, an ABE teacher at Operation Bootstrap, had her students do a "step test" to determine heart rates and to compare them with each other and against a chart offering healthy heart rate guidelines. She used the book *Staying Well, Getting Fit, and Eating Right, Information for Better Living* Series, by New Readers Press, as a basis for this activity. As a result, the students started an Operation Bootstrap Walking Club.

The Healthy Heart Rate activity is further described in *The Incredible Human Body: Incorporating Curriculum Frameworks in the ABE Class*, Operation Bootstrap, Lynn, MA, spring 2000.

Rattana is checking her pulse in Cheryl Carnevale's ABE class on heart rates.

Tools for the Classroom

(Adapted from <www.epa.gov/recyclecity>)

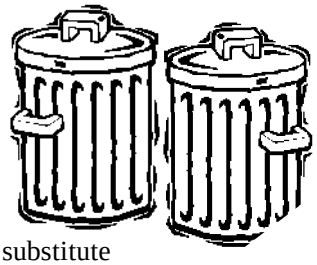
Talking Trash

Population: This activity can be adapted to any population. If it is for beginning-level ESOL you will want to introduce suitable vocabulary and concepts around trash and recycling before doing this activity.

Objectives: Students will investigate some of the factors that influence the decomposition of trash and discuss how accumulations of trash can have long-lasting and far-reaching effects on our society.

Materials:

- Clean dry (non-food-related) bags of trash
- Collection bags
- Disposable gloves
- Journals
- Beakers
- Stopwatches
- Stirring sticks
- Several different brands of toilet paper
- Liquid hand soap for hand-washing or liquid waterless soap substitute



Activity 1: Trash Trek

This is best done in an outdoor venue like a park, school/program yard, etc. Search the school yard or a local park or seashore for trash types. (If collecting trash is not an option, ask the custodian of your program to save a bag of dry, non-food related trash for you) Supply each student with plastic gloves, bag or bucket for holding trash, science journal and pencil.

Review Some Rules: Dry trash only. (If in doubt, ask the teacher.)
Manmade objects only (no twigs, nuts, stones, etc.).
Back in the classroom, have students spread out trash and sort it by type and amount.

Questions: (You may need to review some of the highlighted vocabulary and concepts before asking/discussing the questions.)

- What are the most common objects found in the trash?
- Which items could be reused as is?
- Which items could be cleaned and reused?
- Which items could be broken down and reshaped into useful items?
- Which items are not *reclaimable*?
- Which items will *degrade* within a year?
- Which items will be around in 10 years?
- Which items will be around in 100 years? 1000 years?
- Are there alternatives to the longest lived items?
- What are the pros and cons of the alternatives? (Cost? Function? Availability?)

Continued on page 15

Talking Trash...

Continued from page 14

Follow-up: Students could be asked to speculate about long-term problems associated with certain kinds of trash. Students could be presented with specific activities (drying hands with a paper towel, using a disposable paper lunch bag, wrapping birthday presents) and asked to brainstorm as many creative alternative materials or alternative processes as possible that would reduce the amount of trash generated.

Activity 2: Rate of Decomposition

What sorts of things affect the rate of decomposition of trash? Have students bury different items and dig them up at different intervals to see which decomposes fastest. You might supply some of the items for them, such as an apple slice, piece of toilet paper, and Styrofoam cup, and then ask them to bring in three other items on their own. The items can be buried outside in a garden type plot if it will be left undisturbed by others all year. The items can also be buried in plastic milk jugs with the tops cut off and kept indoors, allowing access even in winter months. If using milk jugs, allow students some choices about the conditions in the jug, such as:

- How does the type of soil affect the rate of decomposition? (Use identical objects in two containers, but use sand in one, potting soil in the other.)
- How does the amount of moisture affect the rate of decomposition? (Use identical objects in two containers, but spritz one with water periodically.)
- How does the temperature affect the rate of decomposition? (Use identical objects in two con tainers, but put one in the refrgigerator, and one on a heater.)
- Does it matter whether the container is sealed or open? (Prepare identical containers. (spread plastic wrap or foil over one.)
- How does the appearance of objects change over time?
- Does the weight of the objects change over time? If so, how can you explain this?

Variation: Toilet Paper Activity

Students can compare how quickly different brands of toilet paper break down in water. Students should have several beakers containing identical amounts of water all at the same temperature. A stopwatch is useful to measure the speed at which fibers begin to separate, signaling that the paper is breaking apart. Students can stir the paper gently, but should be careful to stir each one with equal force and speed.

- Can you come to any conclusions about the properties of different brands?
- Does the rate of dissolving correlate to any other characteristics of the paper (softness, strength, thickness, etc.)?
- Do the fastest dissolvers have any characteristics in common?
- Is there a relationship between speed of dissolving and price?
- Does the temperature of the water make a difference?
- Does it matter whether you crumple the paper or drop it in flat?

Tools for the Classroom

Dissecting a Chicken Wing

(Adapted from *The Incredible Human Body Project* , Operation Bootstrap, 2000)

Population: ABE or intermediate-advanced ESOL

Objective: To examine the skeletal-muscular system

Materials: Dissecting kits, chicken wings, latex gloves, newspapers, paper plates

Overview: This lesson was part of a unit on the skeletal-muscular system. Prior to this activity, the students had worked with a variety of materials, including a science textbook (so vocabulary was familiar to them). For this activity, the students work in pairs.

Directions for Each Pair:

- Cover the tables with newspapers. Put on a pair of latex gloves.
- Take a chicken wing, a paper plate, and a dissecting kit.
- Put the chicken on the table.
- Remove the dissecting kit from the box.
- Examine the wing. Discuss the questions below with your partner. Record your answers in the journal.
  - How many bones are there?
  - How many joints?
  - What kind of joints?
- Carefully remove the skin. Discuss the questions below with your partner and record your answers in your journal.
  - How many muscle groups are there?
  - Are the muscle groups in pairs?
  - What bones does each group connect?
- Try to use a muscle to move another part of the wing.
- Remove the muscles and tendons carefully. Locate ligaments.
- Look for the cartilage.
- There must also be veins and nerves here. How could we speculate about which parts are veins or nerves?

Follow-up : Clean up the area carefully with a diluted bleach solution. Collect students observations on the board for all to see.

Teachers' Comments:
Even the squeamish liked this. There was a lot of conversation between pairs, comparing findings and comments. A couple of the students rushed into cutting their chicken wings apart. When they realized that they had cut too much too quickly, they asked for another wing so they could start over. It was a great way for all of us to apply what we had learned from print.

Prodigal Summer: A Review

By Angela Orlando

Imagine learning about animals, insects, forests, and the intertwining ecological system in which they coexist by staying in a cabin in the lush Appalachian Mountains or by living on a family farm in Kentucky. In Prodigal Summer, Barbara Kingsolver's most recent book, the reader is invited into this world to live through a buzzing, vibrant, and sensuous summer. Along the way, Kingsolver, a biologist by training, teaches us about love, loss, discovery, and the nature within us.

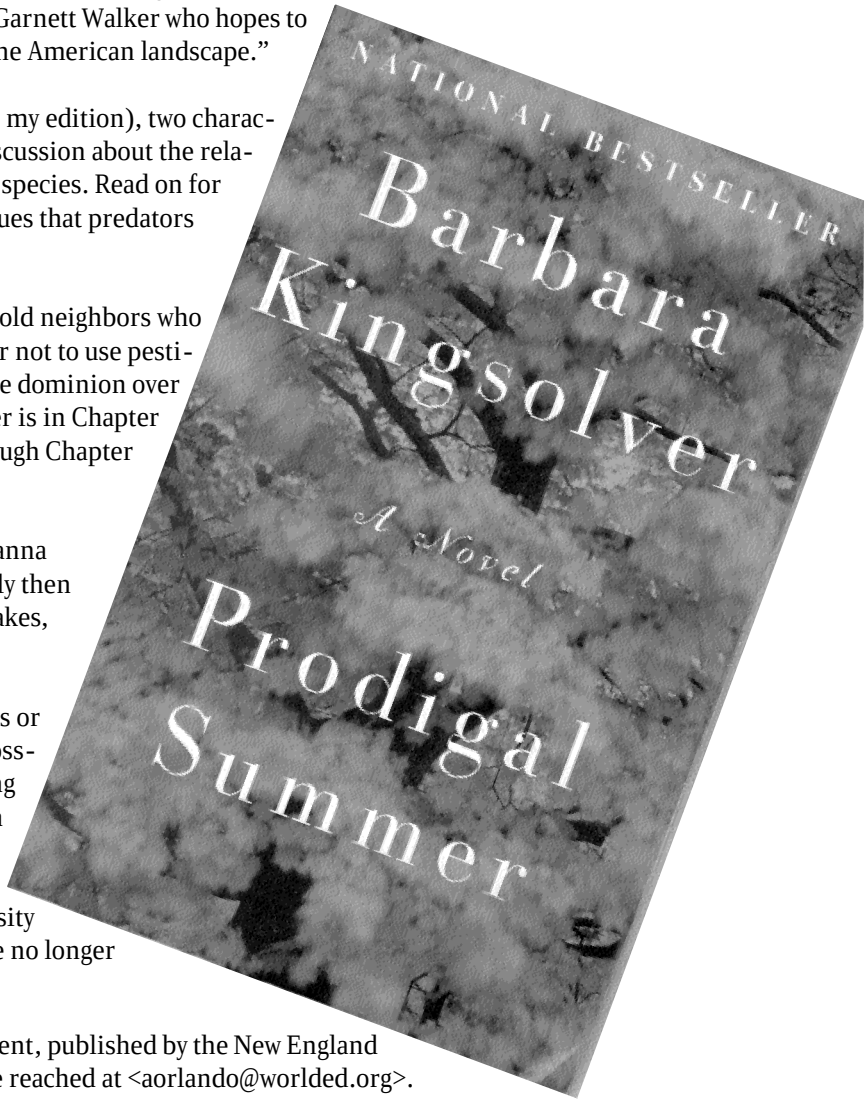
The author weaves together three different stories throughout the novel, each with its own history, struggles, and interactions with the natural world. Through dialogue and description her characters reveal their appreciation for and fear of flora and fauna, the reasons that guide their farming methods, and their ingenuity. Kingsolver gives us so much of this throughout the book that there are boundless opportunities to excerpt reading passages for classroom use. Certainly if a teacher wanted to use short passages and had read the book ahead of time, she could fill in some of the context, but I think some parts can stand on their own. Some of my personal favorites include:

- The first few pages of Chapter 9 that describe the blight of the American Chestnut and the efforts of Garnett Walker who hopes to one day "restore the chestnut tree to the American landscape."

- Midway through Chapter 19 (page 317, my edition), two characters begin a fascinating and heated discussion about the relative importance of predators and prey species. Read on for several pages to learn why Deanna argues that predators should never be killed.

- The exchange (through letters) of two old neighbors who have different beliefs about whether or not to use pesticides and whether humans should have dominion over all the earth's creatures. The first letter is in Chapter 12 and the reply to that is midway through Chapter 14 (page 215, my edition).

- The beginning of Chapter 16 when Deanna comes upon a copperhead unexpectedly then reflects on the interconnections of snakes, birds, and cockleburs.



These passages could be jumping off points or creative additions to broader lessons about cross-breeding and genetics, ecosystems, and farming practices. Though I'm neither a scientist nor a science teacher, I found this novel rich with scientific content that engages, informs, and challenges readers. And with my revived curiosity of the world around me, walks in the woods are no longer the same.

Angela Orlando is the editor of The Change Agent, published by the New England Literacy Resource Center (NELRC). She can be reached at <aorlando@worlded.org>.

ENC Focus: A Magazine for Classroom Innovators

By Sandra Darling

The Greater Boston SABES/ALRI library has a subscription to ENC Focus: A MagazineforClassroom Innovators, published by the Eisenhower National Clearinghouse. ENC identifies effective curriculum, creates professional development materials, and promotes materials to improve math and science teaching and learning. Subscriptions to the quarterly are free and there is also an excellent companion Web site at <www.enc.org>. Recent themes of issues have been on partnerships with business and the community, integrating technology, the standards-based classroom, family involvement, and resources for staff development. The focus is on K-12 educators, but the topics and information are useful and transferable to adult basic education classrooms. Strong content is matched with practical instructional tools and techniques from teachers.

Each issue also presents a listing of materials from the ENC collection of math and science resources. Resources from publishers, government agencies, organizations, and schools are described, and ordering information and price are included. Some of the materials are available at SABES Resource Center libraries, academic or school libraries, and many are free on the Web. The Web site of the ENC allows you to search for resources by topic, level, and price.

Subscribe online at <www.enc.org/register>, or call 800-621-5785, or email <editor@enc.org>.

Sandra Darling is the librarian at the Greater Boston SABES Resource Center/Adult Literacy Resource Institute. She can be reached at <sandra@alri.org>.

Science Materials Available for Borrowing in the ALRI Library

Contact Sandra Darling, Librarian, at 617-782-8956.

- Pocket compasses for lessons on magnetism
- Right-angle prism
- Measurement pitchers: 4-piece set for metric measurement and area and volume studies
- Geometry solids: 12-piece set includes sphere, cylinder, cone, and cube
- Exploring sounds: This kit includes a tuning fork, coiled spring, triangle, mallet, bells, clickers, tubes, straws, and more. Teacher manuals include activities on hearing, timbre, pitch, and vibration
- Scales: for balance and weight demonstration
- Bar mass weights
- Image reflectors: translucent plastic reflectors to explain symmetry, reflection, and congruence (classroom set of eight and a text)
- Geoboards and elastics
- Snakeskin
- Pattern blocks, foam quilting tiles, and unit cubes for pattern-matching, counting, sequencing, sorting, measuring, and weighing
- Calculators: simple solar power calculators, 4 pocket-size and 2 desk-size, with large numeral displays are loaned together for classroom use

From "Scientific Method" to "Doing Science"—Explaining the Change

By Judy Titzel

When many of us hear the phrase "scientific method," we think of a formal process for investigating a scientific question or problem. When we were in school, we were taught that scientists go through a series of steps to find a solution to a problem or find evidence to support or disprove a theory. It all seemed rather cold, analytical, and formal. As in many disciplines, the teaching of science has undergone significant changes and has moved away from the rigidity of a fixed series of steps in what was formerly called the scientific method. It now embraces a more holistic process of inquiry—one where intuition is valued, but informed, and one where the process of inquiry, while still systematic, is not as rigid as it was once framed.

To illustrate this change in thinking, you can turn to the seminal publication in teaching scientific literacy, *Science for all Americans* (a publication of Project 2061, which "consists of recommendations on what understandings and ways of thinking are essential for all citizens in a world shaped by science and technolgy.") I don't think they use the term "scientific method" at all. Instead they talk about curiosity, imagination, and awe as essential habits of mind, terms we don't normally associate with the scientific method we were taught in school.

I think the best analogy that I can make to help understand scientific method is practitioner inquiry. Both scientific inquiry and practitioner inquiry are about shedding light on a quandary through systematically collecting and analyzing data. Both start with observations of the world around us: the natural world in one case, the classroom in the other. Certain things strike us in those observations—some inconsistency, confusion, a question. This might lead to more observing, reading or talking to others, or perhaps consulting an expert. We might clarify the problem and intuit a hypothesis, than decide to gather some data to shed some light on that hypothesis. This new data might in turn lead to more questions or more information gathering. Sooner or later we organize and analyze all our data, check it with what others may know, get input, talk it through with buddies, maybe go back and collect more data, and the process continues.

This inquiry process is organized and reasoned, but not necessarily linear. It is in fact, quite messy, and it's not just a science thing. Inquiry is, in fact, an important problem-solving strategy in our everyday lives.

Fair Trial and Scientific Inquiry

I think what folks confuse is the "fair trial" process with what we are now calling scientific inquiry. A fair trial is setting up experiments with controlled variables. It conjures up images of white-coated lab technicians staring into mysterious mixtures in beakers and test tubes. This is but one small part of what can be included in the scientific process.

One reason for shifting our thinking from the old connotations of the scientific method to that of inquiry is to demystify the doing of science, and to encourage adult basic education teachers to integrate a bit of scientific inquiry into their curriculum, to stir that curiosity, imagination, and wonderment in learning about our world.

Judy Titzel works at World Education in Boston and tutors math and science. She can be reached at <jatdp@aol.com>.

Steps in the Inquiry Process

- Tinker with objects and ideas.
- Make observations.
- Ask questions (e.g., How? Why? What if..?).
- Form hypotheses or make predictions.
- Plan and conduct systematic investigations.
- Analyze observations, data from investigations, and other resources.
- Examine expert information in print and other media.
- Communicate observations, investigations, and conclusions to others.
- Identify unresolved questions, pose new questions.

Adapted from the Massachusetts ABE Science and Technology Curriculum Framework, 2001.

Science Resources

Books

Science within Reach: A Manual for Teaching and Learning Science in Adult Literacy Programs
Rose Strohmaier,
Edmonton, Alberta, Canada: Grass Roots Press, 1998
Available at the ALRI Library.
Contact: Sandra Darling, 617-782-8956

What Can You Do When You Don't Know the Answers to Your Children's Science Questions?
Massachusetts Parent Involvement Project/Museum Institute for Teaching Science
This little pamphlet offers useful suggestions to parents.
Contact: Joel Nitzberg, director, Parent Involvement Project, 781-338-3488

Science Night Family Fun from A-Z
Mickey Sarquis and Lynn Hogue
Middletown, OH: Terrific Science Press, 2000
Miami University, Middletown
4200 East University Blvd.
Middletown, OH 45042

Family Science
Portland State University, 1999
6420 SW Macadam Avenue, Suite 208
Portland, OR 97201

Family Science, Technology/Engineering, and Math Toolkit Workshop
Massachusetts Parent Involvement Project
c/o The Alliance for Education
484 Main Street, Suite 400
Worcester, MA 01608

The Science Explorer
Pat Murphy, Ellen Klages, Linda Shore, and the Exploratorium
New York: Owl Books/Henry Holt and Company, 1996

Compendium of Lessons for Science
Boston: Museum Institute for Teaching Science, 2000
This compendium offers 14 inquiry-based, hands-on lessons developed by teachers in the MITS Summer Institute in 2000. Though developed for K-8, teachers can adapt the activities for adults.

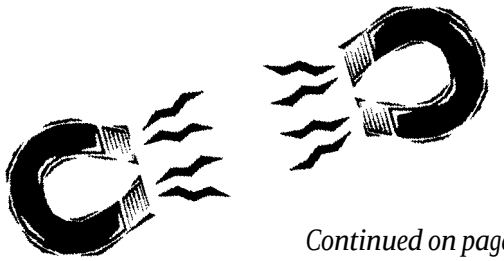
Breaking the Science Barrier: How to Explore and Understand the Sciences
Sheila Tobias and Carl Tomizuka
New York: College Entrance Examination Board, 1992
Available at the ALRI library.
Contact: Sandra Darling, 617-782-8956

The Alphabet of Trees: A Guide to Nature Writing
Edited by Christian McEwen and Mark Statman
New York: Teachers and Writers Collaborative, 2000
Available at the ALRI library.
Contact: Sandra Darling, 617-782-8956

Moon Journals: Writing, Art, and Inquiry Through Focused Nature Study
Joni Chancer and Gina Rester-Zodrow
Portsmouth, NH: Heinemann, 1999
Available at the ALRI library.
Contact: Sandra Darling, 617-782-8956

Materials

Suppliers for Science Materials
Learning Things, Inc.
PO Box 1112
Olean, NY 14760
800-284 5688
Supplier of lenses, mirrors, and other hands on supplies. Recommended by the Parent Involvement Project.



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Science Resources

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Videos

PBS Videos

Breakthrough: the Changing Face of Science in America

Profiles of African-American, Latino, and Native-American Scientists

Personal Stories of Discovery

Available at the ALRI library.
Contact: Sandra Darling, 617-782-8956

Organizations

TERC
<www.terc.edu>
TERC
2067 Massachusetts Ave., Cambridge, MA 02140
617-547-0430
TERC is a non-profit research and development organization committed to improving mathematics and science learning and teaching. It supports inquiry-oriented, project-based learning. This Web site also features online editions of Hands On!, the semiannual TERC publication that reports on the organization's research and development activities.

CESAME
<www.dac.neu.edu/cesame/>
Center for the Enhancement of Science and Mathematics Education
Northeastern University.
716 Columbus Avenue, Suite 378, Boston, MA 02120
617-373-8380
CESAME is a non-profit K-12 mathematics and science education reform organization supported by the National Science Foundation, Northeastern University, and other public and private organizations.Their Web site has links to teacher and parent science education resources.

MITS
<www.mits.org/>
Museum Institute for Teaching Science (MITS, Inc.), founded by a group of Massachusetts Museums in 1983, is a non-profit organization that promotes the teaching of science, mathematics, and technology, in an inquiry-based, hands-on, minds-on method of teaching. They sponsor summer institutes for teachers, professional development seminars, and a parent involvement project. They also participate in sponsoring the Northeast Informal Science Education Network (NISEN) where informal science educators learn from one another.

National Science Foundation
<www.nsf.gov/>
4201 Wilson Boulevard, Arlington, VA 22230
703-292-5111

NSTA
<www.nsta.org/>
The National Science Teachers Association (NSTA)home page has information about various activities related to the development of science standards and frameworks. It provides the Scope, Sequence & Coordination Project, comprehensive curriculum-focused site lessons and materials for biology, chemistry, earth and space science, and physics—all tied to the National Science Education Standards.

Useful Science Web Sites

The Science and Numeracy Special Collections <literacynet.org/sciencelincs/>
The NIFL special collections Web site is the place to start. It offers sections for learners as well as for teachers. A variety of useful links will take you to other science activities and lessons.

<literacynet.org/sciencelincs/teachertutorsci.html>
This site contains links to sites appropriate for the 2002 Series GED Science Test and is organized to the National Education Science Education Standards.

The Museum of Science: Science Learning Network <www.mos.org/oceans/planet>
This site offers interactive investigations through Oceans Alive!, where participants can chart moon phases and tides and investigate water density or predator/prey relationships.

The Exploratorium <www.exploratorium.edu>
The Exploratorium is a participatory museum in San Francisco. This site offers a variety of online explorations.

The National Science Education Standards <www.nap.edu/readingroom/books/nses>
"The National Science Education Standards present a vision of a scientifically literate populace." The 2002 GED Science Test uses these standards as a basis for their questions.

Benchmarks for Science Literacy: Project 2061—The American Association for the Advancement of Science <project2061.aaas.org/tools/benchol/bolframe.html>
"This is a companion report to Science for All Americans. SFAA describes what constitutes adult literacy: Benchmarks suggests how students might progress toward that goal."

Texas Natural Resource Conservation Commission <www.tnrcc.state.tx.us/air/monops/lessons/rubberlesson.html>
This Web site outlines an excellent lesson plan, step by step, to help students determine if the air in their community is polluted.

<www.tnrcc.state.tx.us/exec/sbea/tes/lessons99/hhw.html>
This site offers a number of excellent, well-developed lesson plans on any number of environmental issues. They are easy to execute and contain clear objectives and directions.

Alliance to Save Energy <www.ase.org/educators/download.htm>
This site provides free, hands-on, multidisciplinary lessons in the field of energy and the environment, includes lessons on home energy audits, air pollution, acid rain, and conservation.

AskERIC <www.askeric.org/cgibin/lessons.cgi/Science>
This collection contains more than 2000 unique lesson plans that have been written and submitted to Ask ERIC by teachers from all over the United States and the world.

Whoops!

In the last issue of Field Notes, I made a couple of mistakes in the article "Mocha Chip and Math Class" by Kenny Tamarkin. Kenny notes: "Thanks for putting together the last issue of *Field Notes*. . . There are a few corrections I want to bring to your attention. Sorry if I wasn't clear enough at first. At the time I met Rita DeLeo, she was already a former state director, and had returned to the Somerville School Department. The director at that time was Mary Bodanza. Also, *Number Power 6* is in its third edition, not third printing, in other words, it has gone through two major rewrites since the original came out nearly 20 years ago. I actually don't know how many printings it has had, but the number is probably close to thirty. And while friends told me I made a terrific mocha (I personally can't stand coffee or mocha), I never did make mocha chip."

Lenore Balliro, Editor

Mark Your Calendar

September 18–19, 2002

Pfizer Health Literacy Initiative, 5th National Conference
Health Literacy: Leading Edge Practices
Location: Washington, DC
Contact: Pfizer Foundation, 888-457-3033

September 23–24, 2002

Northeast Science Education Network, 6th Annual NISEN Conference
Building Bridges 2002: Building Partnerships
Location: College of the Holy Cross, Worcester, MA
Contact: Mary Nash, 617-695-9771
Email:<nisen@mits.org>

September 27–30, 2002

Multimedia Educational Resource for Learning & Online Teaching (MERLOT), International Conference
Academic Approaches to Technology: Content, Collaboration, Collections and Community
Location: Atlanta, GA
Contact: Abbe Altman, 707-664-4341
Web: <www.merlot.org/conference>

October 3–4, 2002

Massachusetts Association for Teachers of English to Speakers of Other Languages (MATSOL) Fall Conference
Measuring Our Success
Location: Randolph, MA
Contact: MATSOL, 617-242-1756
Web: <www.matsol.org>

October 4–6, 2002

Gay, Lesbian and Straight Education Network (GLSEN), 6th Annual National Conference
Teaching Respect for All, 2002
Location: Los Angeles, CA
Contact: GLSEN, 212-727-0135
Web: <www.glsen.org/templates/events/index.html>

October 23–24, 2002

Massachusetts Coalition for Adult Education (MCAE) Annual Conference Network, 2002
Location: Marlborough, MA
Contact: Michelle Chaikin, 800-339-2498

"After a discussion with other adult educators, I had a revelation. If I believe (and I do) that my students can learn science, both the process and the concepts, and if I believe in my own skills in reading and evaluating classroom materials and in designing curriculum (and I do) then together we can create experiences that help us ask questions about our world and answer them in a scientific way.I am eager to learn more about science, about how our world works, and I know that most of my students are inquisitive and come to class with questions they want to answer. I hope that if we learn together to use the scientific method, we'll all be able to come to a better understanding of science, the information gathering and problem-solving processes. I really look forward to helping students develop a habit of reflecting outside the class on the ideas they encounter first in the classroom."

—ABE Teacher, Boston
From the Massachusetts ABE Science and Technology Curriculum

EMPower Online

<http://empower.terc.edu>

Our Web site is more than a home for interesting math problems. It is designed to be a catalyst for dialogue about adult basic education students' mathematical understandings. To that end, we have examples of their work, commentary on patterns we see among learners' approaches to problem-solving, and we invite you and your friends to talk back to us. Send us questions, comments, and student work that result when you try the problems. A few times a year, new material will be added. We look forward to hearing your thoughts.

EMPower team members: Mary Jane Schmitt, Myriam Steinback, Tricia Donovan, Martha Merson, and Juania Ashley

Upcoming Issues of *Field Notes*

Winter, 2002–ABE in Prisons
Submissions full

Summer, 2003–ABE Licensure
Call by Nov. 15
Submit by Dec. 1

Questions? Email Lenore Balliro, editor, at <lballiro@worlded.org>

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