

# Connecting Science Learning With College, Careers



## Editor's Note

*Science education doesn't just happen in the classroom. It can take place at a planetarium, in a library, at a science club meeting, or during a community activity. This periodic column will explore the science teaching and learning occurring at museums, nature centers, zoos, state parks, aquariums and other institutions, as well as on radio, television, the internet, and in other media.*

Each school year, teachers must respond to at least one student who asks, "Why do we need to learn this?" To show students how science, technology, engineering, and math (STEM) relate to college courses and the workplace, Ford Motor Company Fund, the philanthropic arm of Ford Motor Company, in collaboration with the Education Development Center (EDC), created Ford Partnership for Advanced Studies (Ford PAS). This interdisciplinary educational

program challenges students academically while developing skills they will need in the workplace: problem solving, critical thinking, teamwork, and communication.

"Ford PAS is a very different approach to teaching and learning," said Cheryl Carrier, program director of 21st Century Education Programs for Ford Motor Company Fund. "Teachers become facilitators, students become employees, and the greater community becomes

the students' resources. By engaging students in this type of learning, it helps them understand how their academics connect to their future career, and they become active learners who take responsibility for their learning."

## Curriculum on Energy, Environment

The Ford PAS curriculum uses a hands-on, inquiry-based approach to teaching and learning. Aligned to national and state standards, it presents issues for students to explore, solve, and discuss, along with related projects they can work on collaboratively. Twenty modules organized into seven themes cover science, business, global economics, engineering, and math. While the curriculum is targeted to high school students, some modules are adaptable for middle and college levels.

Teachers can use the entire curriculum or select particular themes or modules. The most recently developed course, Working Toward Sustainability, concentrates on alternative sources of energy. Four five-week modules focus on energy consumption and related issues associated with fossil fuels, as well

as potential alternative energy sources—from solar to hydrogen to nuclear energy.

Student activities include reading scientific documents, interpreting data, and creating data logs while working in teams. They then apply what they've learned to current political, economic, and environmental concerns.

Dawn Striker, math and science coordinator at Smith Academy in Hatfield, Massachusetts, piloted the unit in her physics class in 2007. "My students welcomed the group work, the daily activities, and the sometimes heated

discussions about renewable sources of energy. They took responsibility for becoming expert at one type of renewable energy and taught their classmates about that energy resource. Pros and cons of each source of energy were investigated along the way, as well as possible financial constraints and environmental impacts. In the end, students made a recommendation to their school board about using renewable forms of energy to power the school."

Phyllis Baca of Santa Fe Community College in Santa Fe, New Mexico, plans to teach the unit. "I am excited that Ford PAS has developed this new course on energy consumption and conservation. Our institution has just begun a new Sustainability Technologies Center, and having these additional tools to integrate green concepts into our teaching will help excite our students about science, while showing them that what they learn in the classroom has an impact beyond school walls."

In another module titled Closing the Environmental Loop—part of the Manufacturing for Tomorrow theme—students examine the environmental impacts of a product's life cycle, from raw materials through processing, use, and disposal. A role-playing activity helps them develop the negotiation skills needed to build financially and environmentally sustainable business partnerships. Throughout the module, students apply what they learn to a product of their own choosing, then present proposals for making their products more environmentally sustainable.

Currently used in more than 300 sites across 26 states, Ford PAS can be part of a school's curriculum, an elective, or an after-school or offsite activity. Modules can be downloaded free from [www.fordpas.org](http://www.fordpas.org).

Ford PAS also has a middle school informal learning curriculum, created by Ford Motor Company Fund and the League of United Latin American Citizens (LULAC) and developed in



*In a Ford PAS business class at La Joya High School in La Joya, Texas, teacher Arnold Gutierrez (center) and students use a computer numerically controlled router machine to cut their car design into a piece of wood.*

collaboration with EDC. LULAC Ford PAS Science Corps consists of materials for 25 two-hour sessions on STEM careers.

Each unit is introduced with a case study and focuses on a specific career area, such as careers related to water. Units include a leader guide, hands-on activities, and suggested field trips and speakers. Access LULAC Ford PAS Science Corps at [www.fordpas.org/sciencecorps/default.asp](http://www.fordpas.org/sciencecorps/default.asp).

### Coordinated Learning Experiences

The curriculum comprises only one part of the Ford PAS learning experience. Partnerships with business, higher education, and community organizations offer informal learning opportunities that support and enhance the curriculum. These “Coordinated Learning Experiences” (CLEs) are considered essential elements of the program.

CLEs include visits from guest speakers and experts, mentoring and job-shadowing experiences, and work-site and campus tours. The Closing the Environmental Loop module, for example, suggests teachers invite business representatives to speak to students about environmental concerns at their workplace. Teachers can arrange for students to tour a waste-processing facility to learn about recycling or visit a farm to examine the environmental and financial impacts of fertilizers, farming methods, and production processes.

After receiving initial Ford PAS training, teachers get help with implementing the curriculum and ongoing support and professional development from partner and site coordinators. These coordinators also oversee the CLEs, promote Ford PAS in schools and communities, and document and evaluate the program. They are responsible for establishing and maintaining the Business/Education Advisory Council (BEAC), which links schools with local businesses, community organizations, and colleges and universities.

The BEAC can provide volunteers to work with teachers and visit classrooms, and it can help schools make other valuable contacts with relevant outside organizations. The BEAC may also help with program planning, budgeting, fundraising, and public relations. ●

**BioScience Excellence™**

Register at [www.GBiosciences.com](http://www.GBiosciences.com) and use code NSTA for a 5% discount

A WORLD OF DISCOVERY

HANDS-ON EXPERIMENTATION

HIGH SCHOOL TO COLLEGE

LEARNING THROUGH EXPERIMENTATION & CURIOUS EXPLORATION

◆ Biotechnology ◆ Life Sciences ◆ Proteomics ◆ Genomics ◆ Microbiology ◆ Immunology ◆

[www.GBiosciences.com](http://www.GBiosciences.com)

\*Offer valid until December 31, 2008

## BioScience Excellence™

### HANDS-ON TEACHING KITS For Junior School to Undergraduate

- Introduces students to hands-on experimentation and many scientific techniques.
- Students achieve a superior understanding of biotechnology & life science fields.
- Kits for introductory experiments for bacteria, DNA and proteins or technique based experiments, including polymerase chain reaction, protein isolation & cloning.
- For General Biotechnology, Microbiology, Molecular Biology, Genomics, Proteins, Proteomics, Immunotechnology & Biotechniques.
- Visit our website or email us at [info@GBiosciences.com](mailto:info@GBiosciences.com) for details.

[www.GBiosciences.com](http://www.GBiosciences.com) • 1-800-628-7730



*There are two possible outcomes: If the result confirms the hypothesis, then you've made a measurement. If the result is contrary to the hypothesis, then you've made a discovery.*

Enrico Fermi, Italian-born U.S. physicist (1901–1954)