Everywhere you turn, it seems science and technology are all the rage. The media is full of stories about new breakthroughs and how they affect everything from agriculture to health care. Bio-pharming is a good example of both. Are consumers ready for medicines grown in crop plants? Is agriculture ready to produce such crops and, if so, how will they be kept separate from other crops?

All of these questions are simmering in agriculture and pharmaceutical industry conversations. Meanwhile, in the world of education, administrators are keying in on reading, math and science test scores. They want to know what your program is doing to increase those scores.

These two seemingly disparate forces can either combine or collide in your classroom. To make them combine and let the resulting kinetic energy work for you, incorporate more science into your curriculum and make sure key people—like administrators—know it’s there. Agriculture teachers who have integrated science into their programs tell story after story about how they reap the benefits by engaging students in hands-on learning. In Georgia, they’ve actually quantified the benefits through increased test scores.

Next comes researching the available options, and they are many. The price tags are just as broad. That doesn’t mean much can’t be accomplished on a small budget. It does mean you may have to be creative to get the ball rolling. Once the ball is moving, you may want to apply for a grant or find other sources of significant funding either to purchase equipment, build specific facilities or both.

This issue of FFA Advisors Making a Difference focuses on agriscience and biotechnology. You’ll see how teachers in Tucson have built a powerhouse program on a shoestring budget and learn how educators in Louisiana are building an agriscience charter school. In addition, you’ll read about 2002 Agriscience Teacher of the Year Harvey Burniston and he’ll share a couple of lesson plans you may be able to integrate in your program. All of these will provide fodder to help make your agricultural education program the best it can be.
For protection and performance, Mystik® exceeds your needs.

It seems each year more and more of your hard-earned income goes into the machinery it takes to keep a modern agricultural operation running. So now, more than ever, it pays to let Mystik help protect your substantial investment in heavy equipment.

Mystik JT-5® Universal Trans-Hydraulic Fluid, Mystik JT-6® premium greases, Mystik JT-7® multi-purpose gear lubricants and Mystik JT-8® super heavy-duty motor oils all readily exceed the level of protection and performance today’s agricultural equipment demands. Even under the most punishing conditions.

Mystik JT-8 customers can also utilize our LubeAlert® analysis program. It lets you review easy-to-understand oil analysis reports and equipment wear data at a convenient and secure web site. It’s an easy-to-use program that can save you money. And you won’t have to wade through mountains of paperwork.

Don’t run your investment into the ground. Do what farmers have been doing for over 75 years. Run Mystik. Look for Mystik products at area farm stores, or call your local Mystik distributor.
Create a Challenging Curriculum

When I first started teaching, my main goal was to just keep my head above water in the classroom and with the FFA program. As expected, it took a few years to get my curriculum to the level I wanted. I continue to revise it a little every year.

One aspect of teaching for which I was not prepared was the student expectation for my class to be an “easy A.” They assumed if they showed up for class sometimes and didn’t cause any trouble they should pass AND with a good grade. In addition, they did not feel they should have to do any homework, nor did they believe the work should be challenging.

Making the Change

I decided I was going to change the image of my program to one where the courses are challenging and earn students’ respect. This wasn’t an easy decision to make because, as we all know, numbers in the seats is job security. It’s hard to venture onto shaky ground, but I strongly believe that agricultural education needs to head in this direction.

Some believe this direction is geared to only the brightest students and we will no longer provide a hands-on outlet for the students who have trouble with traditional courses. I disagree. I feel that creating curriculum that challenges every student and includes the most up-to-date information and material is an excellent way of showing society the importance of agricultural education. Instead of students telling their parents, “Ag is easy—it’s no big deal,” they should be saying, “Ag is helping me so much for the future. It’s hard, but I really like it.”

These are some of the reasons I incorporated classes like biotechnology and pre-vet medicine into my program. I don’t use a textbook with these courses because the material becomes dated too quickly and they are quite expensive. I’d rather use the money to purchase lab materials.

Class Rules

I don’t accept late work unless the student asks for an extension on my voice mail by midnight the day before it’s due. I know my class is not the only thing in their lives, but just as with a job, they have to be responsible and organized. All of my tests are short essay. They take more time to grade, but I don’t feel multiple-choice tests give an opportunity for students to let you know what they’ve learned.

It isn’t easy to step out of the comfort zone, but I have found that since I incorporated a more challenging curriculum with stricter rules on homework and evaluations, I have seen my classroom demographics change. It has gone from kids who don’t care to students who want to learn. These students include all facets—from the top 10 to the special needs.

As long as students are willing to work hard, they will earn a grade they deserve. My program’s reputation has changed and students know when they enter my doors they will have to work hard to get an “A.” This earns the respect of the science department, the administration and the community. Agricultural education is challenging—let’s show that aspect to our students.
Bio-Pharming: Risks and Benefits

In some farming communities, debates are raging over the risks and benefits associated with bio-pharming. Bio-pharming is defined as the production of pharmaceutical ingredients in genetically altered plants. Corn, because of its well-known genetic code, is the most common host plant, although tobacco and other plants are also used.

Governor Thomas Vilsack says, “We’ll make sure Iowa is still the place to be,” for biotechnology firms.

Detractors argue that releasing this type of genetically altered plants into the environment is akin to opening Pandora’s box of pending environmental disasters. They are concerned about everything from pollen contaminating nearby fields to birds eating the grain from these altered plants. They also point to recent debacles where genetically altered crops designated for animal feed have ended up in the human food supply and created massive economic complications (StarLink, ProdiGene).

Rules and Regulations

The U.S. Department of Agriculture is the regulating entity. It has developed stringent rules requiring bio-pharming inventors to keep their experimental crops specific distances from fields of related plants and to time the reproductive cycle of their fields so they are out of synch with those of their neighbors’ fields. In addition, state departments of agriculture are taking on oversight roles to protect their farmers as well as their consumers from questionable crops.

Among the proponents are pharmaceutical companies who say the benefits include:

- significantly decreasing the manufacturing cost of certain pharmaceuticals
- improving patient access to biotech medicines
- facilitating economic viability for bringing more medicines to market for diseases that affect smaller groups of people

Dr. Susan Harlander of BIOrational Consultants in New Brighton, Minn., provides a real-life example of the preceding benefit. Enbrel is a biopharmaceutical product introduced by Immunex Corporation in 1997. It is currently produced via mammalian cell culture and is used to treat rheumatoid arthritis. The drug is among the most important developments in rheumatology. However, there is an Enbrel shortage due to limited manufacturing capacity. In March 2002, there were 13,000 patients on the waiting list. The manufacturer is forced to ration supplies to prevent hoarding.

Here is where bio-pharming comes in. The critical ingredient in Enbrel can be produced in corn plants. 500 acres of genetically altered corn could produce enough material to meet the need for Enbrel.

Opposition

While the pharmaceutical industry strongly supports bio-pharming, the U.S. food industry does not. Many powerful food trade groups strongly oppose the practice and are lobbying federal regulators for new rules that would severely restrict bio-pharming. Many food company executives fear that vaccines, enzymes, antibodies and hormones intended for the pharmaceutical industry might accidentally end up in their products, triggering expensive recalls and legal battles.

Strong arguments are found on both sides of this topic. If the subject is of interest to your students, consider splitting the group into two sections with one researching the benefits and the other the risks of bio-pharming. Numerous resources are available online on both sides of the argument.
Agriscience in Arizona

Flowing Wells High School serves students in the heart of Tucson. While one might expect an urban program to focus on agriscience, one might also expect such a program to be in the high-rent district.

That is not the case here. The school district serves a transient population with high domestic violence rates and 4,200 single-parent families. Approximately 45% of the students live in trailer parks. More than half of them qualify for reduced rate or free lunches.

“When I came here 17 years ago, it was a straight horticulture program,” says Curt Bertelsen, one of the two agriscience instructors at Flowing Wells. “We had a strong program. We were winning state competitive events and great things were happening, but our students weren’t staying in the industry. The work is too hard and the weather is too hot. Basically, we were at the top of our game, but to what end? The year my first student graduated from college it hit me that we needed to change what we were teaching.”

Revamping the Curriculum

Bertelsen continues, “For some students, horticulture made sense. But most of our students needed other things—forestry, veterinary science, biotechnology. I spent a year reworking the curriculum and getting it adopted. We were able to get a science credit for the courses.”

The next year, Bertelsen’s program grew from 60 students to 160 and another teacher was added to the program. “I discovered that the strong science emphasis attracts a whole different group of students,” Bertelsen says. “Today, 80 percent of my students say they’re going to college.”

Attracting Diverse Students

The science focus has also increased the program’s diversity. “It’s the difference between attracting students who rope versus those who want to be veterinarians,” Bertelsen explains. “It also has struck a cord with Hispanic students. All of a sudden it’s a cool thing for Hispanics to be in agriculture.”

Bertelsen continues, “The Hispanic students sometimes have a hard time in school because of language difficulties. Because our courses are so hands-on, there is less of a language barrier. This is a class in which they can succeed and earn science credit. Our program is now 25 percent Hispanic, which doesn’t quite mirror the 31 percent Hispanic student population, but it’s headed in the right direction.”

Earlier this year, the Spanish-language television network Telemundo produced a segment at Flowing Wells that featured some of Bertelsen’s students. “They interviewed some of our bilingual and ESL students,” he says. “It was the first time our Hispanic students received big recognition and it was a turning point for them.”

Community Connections.

Bertelsen didn’t tackle the task of rebuilding the curriculum alone. He drew on community resources. As it happens, one of the largest commercial tomato greenhouses in the world is in nearby Wilcox, Ariz. They were importing their skilled labor from Europe because no one in the United States was teaching hydroponics skills.

Bertelsen also tapped Merle Jensen, designer of The Land at Epcot in Orlando and the Biosphere in Tucson. Jensen is a professor at the nearby University of Arizona with a vision to create a world-class hydroponics program. “He took me under his wing and together we set a goal of showing that high school students were interested in the topic and that industry needed the workers. With our little project, we were able to demonstrate that and the legislature approved funding for Jensen’s vision. The University of Arizona has the first hydroponics program in the United States.”

Professional Development

All of these connections have led to creation of a unique facility and workshops hosted by Bertelsen and his teaching partner, Aaron Ball. For the last several years the two have hosted a Science Alive conference during Christmas break. This summer, they’re hosting two, concurrent agriscience boot camps for teachers July 28-31, one on hydroponics, the other on tissue culture and biotechnology. The next Science Alive conference is slated for April 5-8, 2004. For details on these professional development activities, contact Bertelsen at [curtb@ag.arizona.edu].
Motivating Students to Learn

Ronald “Micah” Story has been teaching agriculture technology at East Jackson Middle School in Jackson County, Georgia, for seven years. Most of his students come from humble homes of low socio-economic status. Educational attainment isn’t high on their priority list.

Despite the odds stacked against him, Story has created a course that engages students and provides new ways for them to learn. “This is not a paper- and pencil-based course,” Story says. “I use a module-based system in which students can pick and choose the topics that interest them.”

**Start with the Basics**

Maybe that’s why almost 90 percent of the students at East Jackson rotate through Story’s classroom while in middle school. The nine-week course is offered six times a day and begins with about 15 class periods of basic agriculture history and technology instruction. At that point, each student selects two modules from a list of 16 that cover everything from robotics and plant science to hydroponics and agricultural mechanics.

“Each module has a manual the students must follow,” Story explains. “This approach simulates what goes on in the workplace. Students learn to stay on task and follow directions. Sometimes they get frustrated because they are given opportunities to make mistakes. This creates a significant fear factor in students who are used to being spoon-fed information. They eventually see how it works and small successes lead to motivation.”

**Building Confidence**

Story says most of the students are intimidated at first. “When the light of understanding pops on, it creates a lot of excitement,” he says. “I frequently hear, ‘I did it, I did it!’ Of course, I also sometimes hear from parents whose children are concerned about the course. I had one father come in and ask why his “A” student was so afraid of my class. We visited about the course and the modules. What it came down to was that the student was scared of taking responsibility; he was comfortable in the spoon-fed world and didn’t want to reach out.

The father related the modules to his work as a computer technician and the problem solving he does on the job. With the father’s reassurance, the course became a real confidence-builder for the student.”

Story encourages teachers to include technology in their courses. “It keeps students’ interest and helps them apply what they’re learning in other classes,” he explains. “Plus, it gives students a chance to experience success in education. This increases their desire for education and opens the door to thinking about careers and college.”

Story works with two students as they tackle a learning module.

**Teacher Fear Factor**

Story acknowledges that introducing technology into courses can also create a teacher fear factor. “You don’t have to be a rocket scientist to integrate technology,” he says. “I was self-taught. Look at what the agriculture industry in your area is using and learn from it. We need to provide our students with those skills so that when they graduate, they have those skills.”

Story uses modules from Learning Labs and acknowledges they are not inexpensive. “I wrote a technology grant to get us started,” he says. “We have about $50,000 of furniture and $70,000 of equipment in our classroom. Most of it was purchased with grant dollars, but the county is very supportive of the program. They cover from $3,000-$5,000 in consumables a year. They see how the students are benefiting from the program, which is why they support it. Students are given a chance to excel with hands-on activities and it motivates them to do better. That’s the bottom line.”

Making a Difference in the Lives of Students
Making a Difference in the Lives of Students

Agriscience Charter School Grows in Louisiana

Nathan Laborde and his teaching partners at the Louisiana School for the Agricultural Sciences are developing a premier institution from the ground up. Located in rural Louisiana between the towns of Bunkie and Hessmer, the school is attracting more students than it can accept and has a waiting list of prospective students.

The Louisiana School for the Agricultural Sciences (LaSAS) is the brainchild of Linda B. Bordelon, the school’s supervisor. Bordelon had visited several urban agriscience schools, including the Chicago School of Agricultural Science, and decided to apply some of the same principles in her rural Louisiana setting. What attracted Bordelon to the concept was the practical, hands-on approach to learning.

Organizational Structure

“The Louisiana School for the Agricultural Sciences is a type 4 charter school,” says Laborde. “That means we’re set up by the state and that the state provided funding for the campus, but that we receive direction from the local school board. We started three years ago with three teachers and an eighth-grade class of 65 students. As we begin our fourth year, those students are rising juniors and we have an overall enrollment of about 250 with about 25-percent minority representation in the student body.”

The school is set up similar to most high schools with the exception that the class sizes are limited to 22 students and there isn’t an athletic program beyond the required physical education courses. The school draws students from across the parish it serves (similar to a county in other states). It is a large geographic area, which tends to create some transportation challenges for students. Most students ride a bus to their local high school, then board another bus for transport to LaSAS.

FFA and SAE

For their first three years at LaSAS, student schedules include academics and exploratory agriculture courses, in which they learn FFA history and start exploratory SAEs. During their junior and senior years, students concentrate their studies in their areas of interest. They can choose to specialize in animal science, plant science, food science or agricultural mechanics.

“Our first class is now at the stage where they’re beginning to develop their SAEs,” Laborde says. “It’s somewhat surprising how few traditional SAE programs we have, even in this very rural area.”

Laborde spends about half his time teaching and the other half as the school’s curriculum coordinator. “A big part of my job is helping the academic teachers integrate agriculture into their courses,” he says. “As the school grows, the curriculum coordination position will grow into a full-time job.”

Benefits

Because of the school’s agriscience focus, all of its students are required to be FFA members. Along with that, the chapter officers serve the role filled by student body officers in traditional high schools. “All school activities and clubs are organized under the FFA umbrella,” Laborde says. “What may be a separate organization at another school is essentially an FFA committee here.”

Laborde is pleased with the arrangement. “Sometimes I think I’m in a dream world,” he says. “I taught agriculture at a traditional school for 10 years before coming here. At that school, athletics were very strong and it was difficult to get students to commit to FFA activities or events, particularly if they coincided with a sports team practice or event. Here, we don’t have those conflicts.”

On top of the course work, the school has received acknowledgement for the quality of its FFA chapter. The chapter has received a gold rating for each of the last three years in the National Chapter Award Program, and last year it was the highest-ranking chapter in the state.

As the school expands to serve five grade levels, it is expanding the opportunities available to all its students, including developing internship and certification programs. For more information about this exciting school, contact Laborde at [nlaborde@avoyellespsb.com].

FFA members from LaSAS work with local elementary students as part of a character program.
Our times a day groups of students bounce into Gina Lunsford’s Northern Middle School classroom to explore biotechnology. Most are seventh graders, but some are eighth graders in this school of about 800 students located in Roxboro, North Carolina.

What’s the key to teaching middle school students a complex subject like biotechnology? Lunsford says it’s hands-on activities and visual aids. “If I don’t have something to show them, I lose them,” she says. “These kinds of tools and techniques make a world of difference.”

Lunsford’s curriculum is broken into units on plants, cells, DNA, career opportunities and leadership, which is where she introduces FFA. She teaches as much as she can through activities. For example, she uses a 4-H embryology unit on incubating chicken eggs to teach about cells. In the plant unit, students learn parts of a flower and learn asexual reproduction techniques in the lab.

Planting a Seed

Lunsford’s program has a 17’ X 20’ greenhouse, which she uses for as many activities as possible. The students grow a crop of pansies in the fall and bedding plants in the spring, and then hold plant sales as fundraisers. “The students love working in the greenhouse,” Lunsford says. “It holds their attention much better than a lecture.”

Lunsford uses the lure of the greenhouse to teach teamwork and responsibility by assigning most of the greenhouse chores to students. “We have a schedule and I send them by groups of two or three to the greenhouse each day to water. The students perceive getting to go to the greenhouse as a treat, so I use it as a tool for maintaining discipline and rewarding appropriate behaviors.”

In addition to hands-on activities, Lunsford incorporates guest speakers and videos into her classes. Plus, the students have an ornamental garden in the back of the school that they maintain with assistance from parents and science students. “Several years ago, we had a student whose father was a landscape designer,” Lunsford says. “He helped us start the garden and we add to it when we can. We usually plant some bulbs and annuals every year.”

Competitive Events

Beyond the classroom and the greenhouse, Lunsford uses competitive events to keep her students interested and motivated. “Each year we have students compete in the agriscience fair at North Carolina State University,” she says. “They’re used to science fairs, this just takes it to the next level and uses an agricultural twist.”

Lunsford’s classes also compete in the Envirothon. “We usually field two teams,” she says. “They love that particular competition.”

Beyond those events based in subject matter, Lunsford’s students also compete in leadership events, including creed speaking and public speaking. They also get a lesson in community service through school beautification projects and participating in community projects through the extension service.

Reaching Out

Lunsford works closely with the agriculture teacher at the high school in her community. “It is a natural resources program,” she says. “My program feeds into the high school program. We work diligently to help students make that transition.”

She encourages her fellow teachers to reach out to their peers for ideas and inspiration. “When I first started teaching, I thought to myself, ‘What have I done?’ The first two years were very hard. I learned the value of reaching out by working with neighboring teachers, and I’ve learned that when we as teachers share our challenges and our successes, we all grow and benefit,” Lunsford says. “My message to other teachers is, ‘Don’t give up.’ When you feel like you’ve hit a brick wall, get on the phone with another teacher and ask for some advice. You might be surprised at the wealth of knowledge you tap into.”

Making a Difference in the Lives of Students
Agriculture + Academics = Success

When Harvey Burniston signed on to teach agriculture at Johnson County High School, Tennessee, in 1982, the situation wasn’t exactly rosy.

“When Mr. Burniston arrived, the agriculture program consisted of one teacher, 100 students and a curriculum out of the 1950s,” says Edward Cook, a retired superintendent of USDA Schools in Europe and a longtime member of the Johnson County Vocational School Advisory Board. “Although denied by the high school administration, the vocational school appeared to be a ‘dumping ground’ for the ‘less-than-gifted’ high school students. There was talk, prior to the arrival of Mr. Burniston, of dropping the agricultural program altogether.”

Cook continues, “It has been my good fortune to serve on the board as Mr. Burniston turned the program around. He began by talking about standards and expectations with his students, then he began changing the curriculum by integrating more science.”

These facts and the long struggle to build a strong program make the sweet taste of success all that much more enjoyable. Among a long list of accolades, Harvey Burniston was named Agriscience Teacher of the Year at the 75th National FFA Convention in Louisville.

By the Numbers

In 1982, the Johnson County agricultural education program had fewer than 100 students enrolled, and only one of them was female. Today, the program boasts more than 400 students and about half are female. The growth has lead to hiring three additional agriculture teachers and two technicians who work full-time to operate the program.

How does a teacher facilitate such a transformation? Burniston started by conducting a needs assessment. “At the time, the agriculture program consisted of traditional production and mechanics classes,” Burniston says. “Tobacco had traditionally been the main agricultural crop in our area, and parents and students were looking for alternatives to diversify their farming operations. The survey revealed the most interest in the horticulture/aquaculture area. I immediately offered one introductory horticulture class and acquired our first greenhouse. Our enrollment started growing steadily and we added courses in agriscience, hydroponics and aquaculture. Since that time, our program has been growing by leaps and bounds.”

Burniston continues, “In the beginning, we didn’t have science lab resources readily available, but with the acquisition of our first greenhouse, the labs and resources were greatly enhanced,” Burniston says. “Students were able to study the actual parts of flowers, germination, propagation, growth rates and other topics first-hand, rather than reading about them in a book.”

What Burniston doesn’t expound on is how he acquired that first greenhouse. According to Cook, “Harvey found a ‘free greenhouse,’ brought it home and erected it with little help or money.” The more one learns about Burniston, the more one admires his resourcefulness.

Hands-on Activities

Burniston makes clear the importance he places on learning by doing. That learning starts in the lab and greenhouse then continues through involvement in FFA career development events and facility tours.

Through a combination of grants and resourcefulness, Burniston and his team have built a unique facility that includes 14,000 square feet of greenhouse space and an aquaculture facility worth more than $500,000. This one-of-a-kind facility attracts people from across the nation and around the world. Burniston and his team have hosted visitors from more than 30 states and 12 foreign countries.

“Students only remember about 10 percent of what we say to them, but they remember 95 percent of what they teach others,” Burniston says. “So, I give my students the responsibility of serving as tour guides for the many groups who come to see our facilities. The first episode usually catches them wide-eyed and nervous, but that soon goes away when they realize they know more than the tour group. Many of these students have never had anyone ‘believe’ in them before or trust them with this type of a responsibility. Providing the tours takes the responsibility off my workload and helps the students develop self confidence, pride and an increased desire to learn and teach others.”

Burniston adds, “People always leave amazed at how much our stu-
students know about hydroponics and aquaculture. The students inspire them and they realize that they are in good hands with this generation of young people. I think it makes them more willing to put money into education as taxpayers.”

Beyond the tours, Johnson County students also integrate the materials they’ve learned in class into PowerPoint presentations and creative skits that they deliver to civic groups, teachers and in state FFA competitive events. Burniston’s students have incorporated what they’ve learned into materials for career development events, including ag issues, ag communications, ag marketing and ag sales.

**Integrating Academics**

A second pillar in Burniston’s success is his focus on integrating academics into the agriculture program. “Integrating agriculture and academics is a win-win situation for students, agriculture teachers and academic teachers—everyone benefits,” he says. “Most classroom teachers are somewhat afraid to get out of their comfort zone, so we have to be a little pushy at first and kind of lead the way. I encourage agriculture teachers to develop a plan and go visit the academic teachers with whom they want to work. It may take several visits and you’ll probably have to show them that you’ll do most of the work before they’ll agree. After you start working with them on a collaborative basis and they start realizing everything agriculture students learn and do on a daily basis, then they tend to become supporters of your program.”

Burniston adds, “Don’t be afraid to pick your biggest critic or worst enemy—the academic teacher who gives you the hardest time about taking students out of class for competitive events or field trips. They can become your biggest supporters.”

Integrating academics benefits students by helping them connect things they’re learning in other courses to real life through hands-on application. “By teaching practical skills through hands-on techniques, students can understand how pH is logarithmic and why it is necessary to study logarithms in algebra,” Burniston explains. “We also implement symbiotic engineering by using fish water to fertilize lettuce and water garden plants over tanks of growing fish. All of this works together to reinforce the material.”

Another example of Burniston’s academic integration is his hydroponics course. “By incorporating hydroponics into the curriculum, we can more easily illustrate the scientific concepts of pH, electrical conductivity, chemical elements and the periodic table,” he says. “Students combine the scientific concepts with business principles in one learning environment as they harvest lettuce, tomatoes and cucumbers, which are sold to local businesses.”

**Student Success**

As with all educational programs, Burniston focuses on student success. Integrating academics has broadened the types of students who enroll in agriculture courses and increased scholastic competition among students. Many of the best students at Johnson County High School are now enrolled in agriculture, including last year’s valedictorian and salutatorian. Last year, Burniston’s top four students received more than $150,000 in scholarships.

Beyond academics, Johnson County students are experiencing success in many different FFA competitive events. Burniston’s students have won many local, district and state awards. These include:

- two state ag sales winning teams
- two state stars in agribusiness
- three star farmers of East Tennessee
- a state star in agriscience
- a national proficiency winner

Burniston says increasing the science is the core element. “My agriscience activities have increased participation in almost every part of our FFA program. We have received what I call indirect results by having more students compete and be successful in career development events and proficiency awards.”

**Teamwork**

Burniston is quick to point out all the accomplishments could not have been achieved without the help and support of an entire team of people. “Our team not only includes the teachers and the students,” Burniston says, “but also the principals, administrators, school board members, county commissioners, city council members and community members. I see each and every award as a community award. We have had such tremendous support and help from so many businesses over the years. In addition, none of this success would have been possible without the help and support of my wife and family.”

Betty Brown, principal of Johnson County High School, is thankful Burniston is part of the JCHS faculty. “Harvey is one of the most outstanding teachers I have ever had the privilege of working with,” Brown says. “He has done more to integrate science into the vocational program than any other teacher at our school. Harvey stresses the importance of using current scientific knowledge in his class labs, and students are frequently using higher-order thinking skills in his classes. Harvey has truly ‘raised the bar’ of excellence in our agriculture and science departments.”
Lesson Plan: Integrating Horticulture and Government

Goal
Students will be able to apply facts, laws and concepts learned in government class to practical real-life situations in a greenhouse-business situation. This practical hands-on approach to government as it relates to a real-world situation will help students develop a more thorough understanding of the material covered.

Instructional Objectives
After completing this lesson, the student shall be able to:

• Identify government agencies that affect or have regulatory powers over horticulture and agriculture.
• Identify possible funding sources (public and private) available to public agencies and private businesses.
• Name some specific regulations or laws with which the agriculture department must comply.

Introduction
Government is about who we are and how we react to day-to-day living and world affairs. The students (future leaders of our county) need to be able to take these facts, laws and concepts learned in the classroom and make them come alive in real-world applications that make sense. This will help them connect what they are learning in school with the real world. Student understanding, application and retention of governmental laws, regulations, etc., will be greater due to this practical, real-world application. The practical application of these principles will better prepare them for real-world situations.

Instructional Procedure
During the 1+ hour block period, government classes and horticulture classes will be combined. The first half of this time period will be a walking tour of the horticulture/aquaculture greenhouses conducted by horticulture and government teachers. Agriculture students will be given opportunities to demonstrate and explain several tasks and tests that they normally undertake in daily greenhouse operations. Some of these tasks may include pest monitoring, measuring temperature, humidity, electrical conductivity, pH, greenhouse sanitation, safety standards and regulations, record keeping and public relations activities. All students will listen and ask questions.

During the course of the tour, teachers will also interject facts and information on the funding of school building projects, grant sources, grant writing, competitive grants, political grants, public relations, agriculture laws and regulations and the Federal Drug Administration among others.

After the tour has concluded, both classes will assemble in the classroom for a roundtable discussion on the practical and actual application of governmental laws relating to agriculture, including grants, regulatory agencies and other pertinent information or questions that may arise during the tour.

Evaluation
Students in both classes will contribute to discussion during the feedback session or roundtable discussion part of the lesson. Due to the interactive approach of this lesson, students should retain a higher degree of learning, and retain a higher percentage of material taught.

Students will be tested on the material covered in this lesson. Test results should indicate a more thorough or practical understanding of the material presented.

Media and Materials
None required for the particular lesson, however, many sources are used for prior learning and background information such as:

• government textbook
• Food Quality Protection Act
• Worker Protection Standards
• Environmental Protection Agency materials
• Food and Drug Administration materials
• greenhouse inspection laws
• grant sources
• grant-writing materials
• public relations materials
• safety standards
Lesson Plan: Aquaponics Setup or Symbiotic Engineering

**Goal**
Show students how to set up a simple aquaponic unit.

**Materials**
- approximately six feet of 3/4” PVC pipe (depending on the size and number of systems to be built)
- two 3/4” elbows
- two 3/4” tees
- approximately six feet of flexible tubing (the diameter will be determined by your pump size; usually 1/2” tubing will fit over a 3/8” pump discharge)
- one aquarium or other suitable tank
- approximately 10 feet of feed tubing (the type used for drip irrigation)
- one punch for punching holes in irrigation line for each feed tube
- fish (number will depend on size of tank, normally one inch of fish per gallon for an aquarium)
- lettuce or other type of green leafy plant (these can be started in rockwool or oasis cubes and then placed on channels)
- five channels approximately two feet long for an aquarium table setup (this is very flexible depending on the size of the tank); lettuce channels are available at any hydroponic supply store or use 1-1/2” PVC pipe with 3/4” holes drilled 6” apart and use an end cap
- one submersible pump (size depends on system)
- drip tubing (approx. 1 ft. for each channel)

**Instructional Objectives**
After completing this lesson, the student shall be able to:
- explain a simple symbiotic relationship
- list some of the ways plants benefit fish
- list some of the ways fish benefit plants
- talk about balanced ecosystems, etc.

**Introduction**
This particular lesson can be adapted to the greenhouse, shop or classroom situation. It is also a lesson that your students can implement with elementary schools and use for a demonstration lesson for Food for America, PALS, career day, etc. It can also be done as an academic integration project with a biology class.

The method can be given the term “symbiotic engineering.” Review the term “symbiotic” with students. Explain to them how the term can relate to agriculture. In the system they will be creating, the plants will be benefiting from the fish by taking the nutrients, especially nitrogen (ammonia), from the water. The fish will benefit from having the nutrients (especially the nitrogen), which can be detrimental to fish health, removed from the water. They will also benefit because the water that splashes back into the tank or aquarium is better oxygenated. This oxygenated water benefits both the fish and plants. While this demonstration is set up on a very small scale, it illustrates how a farmer can use it to save on nutrients (fertilizer) and how one can use a multi-crop system to maximize profits.

**Instructional Procedure**
These instructions are for a 10-gallon aquarium, as pictured. Use an aquarium that already has fish in it in the classroom or fill a new aquarium with non-chlorinated water. Cut four pieces of 3/4” PVC 4” long for bottom of stand. Insert each piece into the two tees horizontally. Cut two pieces of PVC 12” long. These are the upright pieces for the stand. Insert into tees.

Cut one piece of PVC two feet long. This is the top horizontal piece of the stand. Place 4-5 channels of 1-1/2” PVC pipe with 3/4” holes drilled six inches apart from stand to aquarium overhanging approximately 1-2 inches over the top of aquarium. Place pump in the bottom of the aquarium. Insert irrigation line onto pump and run it to the back of the channels. Use the punch to pierce one hole in irrigation line for each channel. Cut feed tubing approximately 18” long. Then insert one end in irrigation line and other end in back of channel. The irrigation line will seal itself around the feed tubing. Plug in pump and add plants and fish.
Infusing Science into Agricultural Education:  
The Result Might Amaze You

In today’s educational system, students are constantly faced with the need to assure themselves that they have all of their required courses covered so they can continue their education at the post-secondary level. This dilemma, in turn, creates a challenge for the local agriculture instructor to recruit and retain students on a yearly basis. My guess is that many of you in the field today at one time or another have asked, “How do I recruit and keep my students interested and involved in the agriculture program?”

Explore infusing agriscience as a possible answer. Making education practical by tying everyday experiences to education is what we do best, and science is the heart of agriculture. Why not use scientific principles and methods to reinforce what is taught in your classroom everyday? Across the country, agriculture teachers who are increasing the amount of science in their programs are being met with positive answers.

Science Credits

Explore the options that your state may have in providing both science and laboratory science credit for agriculture classes. Many programs have found that by adopting a state-approved curriculum, they can offer science credit and thereby attract a wider slice of the student population.

Do you have a good working relationship with your school’s science department staff? If not, it may well be time to get to know them and create opportunities to work together to team teach specific skills or share labs. By working together, you can provide the best possible opportunities to the students you serve. The 2002 Agriscience Teacher of the Year, Harvey Burniston, provides great examples in the story on pages 9–12.

Focus on Careers

There are an unlimited numbers of careers available for your students that require scientific knowledge, principles and practices. By teaching agriscience in your classroom and laboratories, you are providing students with more tools for their employment toolkit.

Tomorrow’s jobs will be filled with the students of today. In some cases, jobs that we are preparing students for are not even in existence yet. We need to utilize every opportunity to motive and excite our classes. Hands-on agriscience activities have a strong track record in that area. Take a look at infusing science into your agricultural education program, the end result might amaze you.

Applied Science

Take a look around your local community. Are the principles of agriscience in use? If you teach in a rural community, you’ll likely find farmers using GPS units on everything from fertilizer applicators to combines. If you live in a suburban or urban area, you’re probably surrounded by businesses that apply agriscience principles to increase efficiency, decrease the use of pesticides in populated areas and more. If so, then this option is truly one to explore.

In most cases, you are already teaching agriscience in your everyday curriculum, even though you may not call it that. Do you instruct students on calibrating spray or irrigation equipment? If so, you’re teaching applied chemistry and math. Animal reproduction and physiology is just that. I am sure the laws of physics are reinforced in many agricultural mechanics courses across the country. Use the opportunities that we all have to reach and retain your students, while you attract even more.

Resources Available

There are several resources to help you get started in these areas. The Agriscience Handbook, along with the most recent agriscience applications can be found on the current Local Program Resource Guide CD-ROM, which is available from the National FFA Organization. All local programs receive an updated CD each year at the start of the new school year.

If you have any questions concerning National FFA agriscience programs or have information you would like to share, please contact Christy McDaniel at [cmcdaniel@ffao.org] or call 317-802-4402.

Making a Difference in the Lives of Students
as part of the National FFA Organization’s 75th anniversary celebration, FFA is producing a coffee table book and a public television special.

**Coffee Table Book**

The book is being written by Paul Miner, who also authored the Indiana State Fairgrounds’ 10th anniversary book. Miner, who has been writing about rural life and agricultural news for the last 14 years, covers central Indiana and the state house news for Farmer’s Exchange newspaper.

The book’s approach tells the FFA story with photos, illustrations, graphics, lean text and informative captions. The 160-page book is being published by M.T. Publishing of Evansville, Ind., and will be available for sale at the 2003 National FFA Convention for $29.95. The book will make an excellent gift for those whose roots run deep in FFA.

**Television Special**

The public television special is part of the PBS “Voices of Vision” series, which profiles the people and organizations whose leadership efforts are making a significant impact on national or worldwide problems.

Robyn Symon has been assigned to produce the FFA episode. Symon has received two Emmys for her work, including one for the program, “Ernest Hemingway, Life in Key West.” Symon is reviewing vast amounts of information provided by the National FFA Organization and working with a field producer to create the program.

The program is scheduled for release to the PBS networks in September. You will be able to see a preview during the 2003 National FFA Convention.

---

**FFA Member Named Toyota Community Scholar**

When it comes to farm safety, FFA member Wrevenna Nadyne Phipps speaks her mind. The Kearney, Neb., resident estimates she reached more than 57,000 people from June 1999 until March 2003, when she took a leading role in promoting farm safety. Phipps served on national boards and spoke to a variety of civic organizations on this important issue.

This year, Phipps’ contribution to community service and academic excellence was recognized when she was awarded a $10,000 scholarship by Toyota Motor Sales, U.S.A., Inc. One hundred high school seniors were honored by Toyota with $1.12 million in college scholarships for their commitment to education and community service.

The winners, who make up the seventh class of Toyota Community Scholars, were chosen from a pool of nearly 10,000 students nationwide nominated by their schools. To be eligible, students must be proven leaders both in the classroom and in their communities.

The scholarship winners were guests of honor at an awards banquet in Louisville, Ky., that was attended by education, community, business and government leaders. Dr. George McKenna III, who transformed one of Los Angeles’ most troubled high schools from a failing institution to one where nearly 80 percent of the graduates go on to college, was the featured speaker.

The Toyota Community Scholars program is administered by Educational Testing Services in Princeton, N.J. The 12 national winners ($20,000 each) and 88 regional winners ($10,000 each) were selected by a panel of university admissions officials from across the country.

The Toyota Community Scholars program began in 1997, Toyota has awarded $7.84 million in scholarships to 700 students across the United States.

---

**Making a Difference in the Lives of Students**

L-R: Lynn Campbell, lead regional director-major gifts manager, National FFA Foundation; Gene Honn, team leader, National FFA Foundation; Wrevenna Phipps, scholarship winner; and Kent Schescke, division director-development and partnerships, National FFA Foundation.
Student, Chapter and Community Development: Why not PALS?

Most agriculture educators know chapter planning should address three key areas: student development, chapter development and community development. There are few programs available that can truly address all three of these areas at once; however, the Partners in Active Learning Support (PALS) program provides a wonderful opportunity to make an impact in each. This life-changing program has recently been revised to make an even broader impact upon the youth served by FFA and in their communities.

Student Development

PALS addresses student development in many ways. The mentoring process has a profound effect on the mentee, but also has a significant impact upon the mentor. Research has begun to try and measure some of these effects. In conversations with teachers who utilize PALS in their programs, they have seen these effects first hand. They report increased participation in other FFA activities by those who serve as PALS mentors.

Every FFA advisor looks for ways to increase the number of students who participate across the board in the FFA chapter. PALS can be a marvelous tool to spark interest in those members who are looking for ways to get involved. Also, the responsibility placed on a mentor and the relationship they develop with the mentee can be crucial in developing a better understanding of diversity, healthy lifestyles and leadership.

Chapter Development

The PALS program also offers many opportunities for advancing chapter development. PALS programs appeal to a diverse audience of students and increase the ability to recruit non-traditional students. It exposes FFA in a positive light to younger students who gain an understanding of agriculture and FFA that may increase the probability that they will take agriculture courses and join FFA once they get to middle or high school.

Community Development

Beyond recruitment, the partnerships and collaboration PALS helps build within a school system allows the FFA chapter to gain a positive status within the educational system. PALS can help a chapter build a positive rapport with the community and build validity with educational leaders. At a recent PALS training held at the National FFA Center, this program brought FFA advisors, elementary teachers, school counselors and administrators to the table at the same time. Within your community, PALS provides a reason to bring these same players to the table and expose them to your FFA chapter.

A key part of chapter planning should involve service learning and the chapter’s ability to make a positive community impact. Through PALS, chapters can increase agricultural literacy and open the door to community understanding of agriculture through elementary-aged students.

Furthermore, this program offers mentors the ability to work with at-risk youth and help elementary teachers increase the academic achievement within their classrooms. One of the key tenants of the PALS program is also to increase the awareness of healthy lifestyles among youth, in turn promoting a healthier and stronger community. The PALS program has a unique ability to affect the community in so many ways through the contact between elementary students and FFA members.

This speaks to the original question, why not PALS? The PALS program can affect a FFA chapter in many positive ways and crosses over all the areas in which FFA chapters strive to make an impact. Whether you already are using PALS or not, you should take a strong look at how a well-organized PALS program can impact the success and validity of your chapter.

This summer new PALS training materials are available through a variety of trainings being offered by states. Twenty-two states have nominated state PALS mentors who are providing training and free materials to their colleagues. If you’re thinking of starting a PALS program, or if you have been involved with PALS for years, I encourage you to attend a training session and take a look at the many positive benefits this program has to offer your chapter, community and students.
**Teacher Resources**

**Opening Doors Materials**

Have you ever wanted to tailor a presentation about FFA and agricultural education to fit your specific marketing needs? *Opening Doors* is a powerful set of educational resources created just for you. *Opening Doors* has several components—a printed brochure, matching letterhead, template letters and PowerPoint presentations. Each of the tools has been designed to complement the others with a consistent tone, look and feel. As individual materials, they powerfully communicate the story of FFA and agricultural education. Used together, they convey a message that is magnified and strengthened. Take advantage of these beneficial materials to build new relationships and strengthen existing partnerships.

Each chapter should have received a sample of the *Opening Doors* printed materials. Online materials can be downloaded at [www.ffa.org/chapters/html/opendoors.html](http://www.ffa.org/chapters/html/opendoors.html). Brochures can be ordered at [www.ffaunlimited.org/opdoorbroc1.html](http://www.ffaunlimited.org/opdoorbroc1.html).

**Fun, Science-Based Activities**

Free subscriptions of Exploratorium’s e-newsletter for educators, EduNews, are available online on the EDUCATE page of the organization’s website, [www.exploratorium.edu](http://www.exploratorium.edu).

**Biotechnology Resources**

DuPont is interested in being a resource for educators and their students on topics related to biotechnology. DuPont’s website offers information in English and Spanish on the science behind biotechnology as well as the regulatory structure and other important aspects. The site also includes links to other resources. Anyone is welcome to visit the site at [www.dupont.com/biotech/](http://www.dupont.com/biotech/), or DuPont can be contacted toll free at 1-877-333-1027.

**Summer Chapter Planning**

Do you help plan or coordinate chapter activities? Summer is the best time for your preparation. If you have a Local Program Success CD-ROM, all of the forms and supporting material you need are there. Easy-to-use templates also are on the CD-ROM, eliminating the need to tear those out of a handbook and then labor on the typewriter. Your computer is all you’ll need! If you do not have the Local Program Success CD-ROM, contact your state staff representative or visit the FFA website at [www.ffa.org](http://www.ffa.org).

**Farm Safety Day Camp**

Each year, an estimated 33,000 children who visit, live or work on U.S. farms or ranches are injured. More than 100 children die of agricultural injuries annually. Each injury and death can be prevented. Started in 1995 by Progressive Farmer magazine, the Progressive Farmer Farm Safety Day Camp program provides community coordinators with the resources and training to conduct a farm safety day camp in your community.

If your local FFA chapter is interested in conducting a farm safety day camp, you will need to complete an application and submit it to the staff of the Progressive Agriculture Foundation, which funds the farm safety day camps. An application may be downloaded from [http://kea.ae.iastate.edu/about/default.asp](http://kea.ae.iastate.edu/about/default.asp), or call 1-888-257-3529 for an application and additional information. Applications are due by July 15.

**Agriculture Counts Lesson Plans**

The United States Department of Agriculture’s National Agricultural Statistics Service has developed for K-12 teachers an integrated curriculum called Agriculture Counts. Through these lesson plans, agriculture is infused into English, math, science and social studies. See what is available by visiting [www.usda.gov/nass/nasskids/resources/resources.htm](http://www.usda.gov/nass/nasskids/resources/resources.htm).

**How Stuff Works**

Looking for supervised agricultural experience or career development event ideas? “How Stuff Works” is an idea website that can provide a place to start. This diverse site is an excellent tool for both rural and urban agriculture students. It explores the intricacies of how engines, evolution, nature conservancy, organic food and fusion propulsion works, and a host of other subject areas. Visit [www.howstuffworks.com/](http://www.howstuffworks.com/) and see “How Stuff Works” can work for you and your students.

**Turn Ideas Into Cash**

How would you like to get $500 cash for marketing ideas that just came naturally as you taught class or assisted your students with publicizing an activity or program? If those ideas align with any of the core competencies used in the National Curriculum Standards for Marketing Education, then you (or your students!) have an opportunity for your ideas to be recognized in print and cash. Complete details can be found at [www.Mark-Ed.org](http://www.Mark-Ed.org).
Activities that qualify an individual for the H.O. Sargent award are as varied as the imagination and resources allow. This is in part because “diversity” is broadly defined to embrace the following areas: ethnic, cultural, geographical (ex., rural, urban), gender, ability, career cluster, education. Past award recipients have implemented pen pal programs, organized NFA awareness activities, designed membership recruitment campaigns, mentored students of differing abilities, delivered presentations to non-agriculture audiences, performed community service, and coordinated community partnerships for community service events. If you are uncertain about whether an activity qualifies, submit the application and let either your state staff or us be the judge!

For an application or more details, visit the National FFA Organization website at http://www.ffa.org/programs/hosargent/html/app.html#MEMBER. Or call Damon Spight at 317-802-4244. The H.O. Sargent Award program is sponsored by Monsanto as a special project of the National FFA Foundation.
Communication Resource Index on ffa.org

A whole host of communication resources for state and local use is now available online at [www.ffa.org/comm/commindex.html]. The new Opening Doors materials are available here, as are standards and guidelines covering topics such as news releases, key messages and frequently asked questions. Throughout 2003 and 2004, FFA will be adding new materials to this resource index every quarter, so check back often to see what’s new.

GLOBE Learning Expedition

The 2003 GLOBE Learning Expedition will be held in Sibenik, Croatia, June 29 through July 4. The Learning Expedition will be an opportunity for teams of GLOBE students from around the world to meet one another, learn together, and present the results of their GLOBE projects. GLOBE is a worldwide hands-on, primary and secondary school-based education and science program. The conference will feature plenary and parallel sessions in which GLOBE students will present research projects showing how they use GLOBE data. In addition to the student presentations, activities will include a day of fieldwork at the Krka National Park and an excursion by boat to the island of Obonjan. At the Conference Center, an Internet Cafe will enable participants to stay connected to home and to other GLOBE students participating electronically. The Exhibit Hall will include displays from GLOBE Countries and GLOBE schools around the world. For more information, contact Dr. Carol Conroy, cconroy@globe.gov.

Special Needs Assistance CDE Policy and Procedure

During the past year, the National FFA Organization has taken an intense look into the workings of policies and procedures regarding special needs assistance for students with physical or mental disabilities participating in career development events. As a result, a new policy has been enacted effective for the certification process of all 2003 National FFA Career Development Events. Some key points of the new procedure are as follows:

• The National FFA Organization has partnered with the Adaptive Educational Services office at Indiana University/Purdue University - Indianapolis (IUPUI). This group will serve as an independent source of review for all special needs requests. This office handles the special needs assistance process for the university and has individuals trained and certified to help FFA staff determine what accommodations need to be provided. Once FFA receives documentation on a participant, they will review the documentation and give recommendations of what accommodations should be offered.

• All special needs requests for 2003 National FFA Career Development Events need to be sent to the National FFA Center along with the CDE certification forms. These forms are due July 10. If FFA receives special needs requests after that time, the organization cannot guarantee that there will be adequate time to process them. The National FFA Organization is aware that some states certify teams later than that date, but FFA can make no guarantees that the documentation will be reviewed and accommodations offered for participants whose documentation is submitted later than July 10.

• The type of documentation that must be submitted for a special needs request for a participant in career development events has changed. Acceptable documentation will have to include test results or information regarding the disability from medically certified doctors, psychiatrists or psychologists. This measure is to ensure that FFA serves those who truly have a disability and are in accordance with federal legislation regarding serving those with disabilities.

• The purpose of this policy is to adhere to the law while also protecting the integrity of the National FFA career development events. This policy will allow the National FFA Organization to better serve those members with true medical or mental disabilities. Students who do not read on grade level have a learning deficiency. However, this does not constitute a true medical or mental disability.

All the forms and final details for the new policy and procedure are in place. For anyone who is certifying teams or has any questions, please contact Mike Honeycutt, mhoneycutt@ffa.org, 317-802-4263, or Alyssa Peterson apeterson@ffa.org, 317-802-4263.

Agriscience Fair Application Change

There are two changes to the Agriscience Fair Rules: a) in team divisions, both members are required to be present for judging to qualify for placing and awards. b) rules for use of embryo subjects has been added to “Safety Rules.” The only change to the application is the addition of the Agriscience Fair Certification Form. This form should be filled out completely, signed and submitted with the certification and abstracts by Aug. 15 to Christy McDaniel, National FFA Organization, 6060 FFA Drive, Indianapolis, IN 46268. For more information, contact Christy McDaniel, cmcdaniel@ffa.org, 317-802-4402.
It is debated whether agricultural education programs are unique from other high school programs in content or instructional strategy. I believe both are unique.

The use of problem solving, applied learning and making connections to development of the whole person through the FFA is a unique educational approach. Recently, the National Council for Agricultural Education established a National Agricultural Education Research Workgroup. This group examined research to determine if teaching/program practices used in agricultural education are effective in increasing math, science and reading scores.

The review of the science education literature reveals increased scores can be achieved through inquiry-based, informal learning instructional approaches. While further research is needed, it looks promising that using problem solving, SAE and FFA is, indeed, effective in increasing science scores. These practices are analogous to practices identified in science education literature and thus are preferred in teaching agriscience.

**Increasing Science Content**

Today, a strong case can be made for including a significant amount of “high” science instruction in the agriculture program. The need for the industry to assure an abundant and safe food supply has implications for the use of biotechnology, identity-preserved practices, precision farming, etc., which, in turn, has implications for instruction in science theory and technical application.

In addition, rapidly advancing technology has resulted in changing job requirements. In today’s work environment, 70% of all jobs require some type of postsecondary education. An additional 20% require a bachelor’s degree. With these data, one might say that 90% of our students will need to pursue postsecondary education, most of which will require the understanding and application of science.

There is a need to include “high” science in our agriculture programs. This will assure a place for agriscience instruction in the high school and attract a more diverse set of learners. Agriscience education will prepare students to pursue high-level jobs in the agriculture, food and natural resource industry.